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THE

CERTAINTIES OF GEOLOGY.

"SHALL it any longer then be said, that a Science which unfolds such abundant evidence of the Being and Attributes of God, can reasonably be viewed in any other light than as the efficient Auxiliary and Handmaid of Religion? Some few there still may be whom timidity, or prejudice, or want of opportunity, allow not to examine its evidence; who are alarmed by the novelty, or surprised by the extent and magnitude, of the views which Geology forces on their attention; and who would rather have kept closed the volume of witness, which has been sealed up for ages beneath the surface of the earth, than impose on the student in natural theology the duty of studying its contents; a duty in which for lack of experience *they* may anticipate a hazardous or a laborious task, but which, by those engaged in it is found to afford a rational, and righteous, and delightful exercise of their highest faculties, in multiplying the evidences of the Existence, and Attributes, and Providence of GOD."

REV. PROFESSOR BUCKLAND, D.D.
Bridgewater Treatise, p. 594.

"The facts of Geology have been scrutinized with the utmost jealousy and rigour; and they stand impregnable;—their evidence is made brighter by every assault."

REV. DR. PYE SMITH, *Relation of Geology and Scripture.*

THE

CERTAINTIES OF GEOLOGY.

BY

WILLIAM SIDNEY GIBSON, F.G.S.

QUOD VERUM TUTUM.

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TO

THE MOST NOBLE

HENRY, MARQUESS OF LANSDOWNE, K.G.

D.C.L. F.R.S. L. AND E., G.S. M.R.S.L. ETC. ETC.

THE PRESENT ESSAY

IS

WITH HIS LORDSHIP'S PERMISSION,

RESPECTFULLY DEDICATED,

BY HIS LORDSHIP'S MOST OBLIGED AND FAITHFUL

HUMBLE SERVANT,

THE AUTHOR.

PREFACE.

THE following Essay appears at a time when the Science of Geology has fully established its claim to occupy, and does in fact, possess, a most brilliant and remarkable distinction, and commands an increasing degree of attention and regard; when the public mind is rapidly opening to the wondrous scenes it presents, and to a sense of the surpassing interest that attaches to its discoveries, and to every thing connected with the geological history of the globe; when none ought to claim credit for a well informed mind, without possessing a knowledge of at least the subjects and leading results of geological research; and at a time, moreover, when intellects of the highest order are zealously employed in its cultivation; and some of the most recondite conclusions and results of science are familiarly added to the common stock of popular information. Of a work written at such a period

of geological science—under such eminent auspices, and highly scientific support, as the author has the honour and good fortune to enjoy on this occasion—of a work written too by a new author on the subject, and by one, moreover, who is a member of the Society to which Geology is known to be so greatly indebted for the elucidation of its inherent merits, and for its present exalted position in the range of natural philosophy, it might fairly be expected that it should promise and afford some original and highly scientific additions to geological information,—additions which should be suited to so advanced a state of geological knowledge. At the same time, however, it is to be recollected that treatises, manuals, and other institutional works of highly scientific character and well merited reputation, being in the hands of the public; and the more modern of many of those works well according with the actual state, and faithfully representing the great principles of geological science, much would fairly be expected of the author who should now venture to add another systematic treatise to such a store of scientific information. And, therefore, having regard to the different and less assuming character of the present Essay, the Author may be allowed to flatter himself with the hope that its particular object will relieve him from liability to the charge of presumption, in placing it before the public. The richness and diversity of scientific details must not be looked for in the following Essay. Its want of those

distinctions—if not excused by the particular objects of the work—will, the author hopes, be thought to be compensated in his endeavours to enforce, as he has never failed to recognize, the great result to which the pursuits of science, in all "its vast survey," should ever lead, viz. the illustration of the constant superintendence of an Almighty Being, and the constant impress throughout creation of an Almighty Hand,—demonstrated not only through the vast range of existing nature, which it is the province of other sciences to investigate; but, throughout those mysteriously remote and venerable monuments of primeval ages, which Geology alone possesses the glory of having restored, and of having exhibited, and even rendered familiar to our comprehension, at this immeasurably distant period of time.

The author can only claim credit for the motive which has led to the composition of the following pages;—for a very enthusiastic admiration of the science of Geology;—and a sincere desire to see the value and importance of the study, and the validity of its conclusions, unanimously acknowledged, and by all persons justly esteemed and understood; and for the motive of his present endeavour to extend the growing taste for the cultivation of geological pursuits—to vindicate a science with a conviction of the importance, the useful relations, the interest, and the exalting tendency of which, his own mind is most forcibly impressed, and to contribute, however humbly, in placing

so great a subject on its proper footing before the world.—And he cannot but feel gratefully sensible of the 'vantage ground bespoken for this endeavour, by the fact of his being permitted to make it in connexion with patronage so flattering and eminent, and to do adequate justice to which he must inevitably feel his own inability.

To those persons who have made Geology their study, and to most of those eminently scientific patrons who honour the Author with their support for the present work, he feels that the arguments it brings forward can hardly present any features with which their studies have not already acquainted them, nor establish for Geology any merits which they do not fully award to it, or any claims which they do not already know it to possess. The arguments brought forward in the present Essay need not be addressed to the geologist already acquainted with the testimonies of his science to natural religion, but to the noviciate inquirer;—nor need they be addressed to the theologian, skilled in the deduction from scientific investigations, of evidence to the Being, the Wisdom, and the Perfections of God. Those persons, however, who know, and can best appreciate the exalted merits of geological studies, desire to see that knowledge extended also to those, whose want of previous acquaintance with Geology, or whose too ready credence of the misrepresentations of its few, but actively mischievous opponents, has led them to doubt the exalting tendency of its truths, and has de-

barred them from participation in the peculiar, the surpassing interest and satisfaction which every rational and every sincerely religious mind must experience in the cultivation of this noble science.

The author is sensible that far more than *his* efforts can accomplish, must be expected from an author who shall presume to write on the subject of Geology, and particularly who shall consider it in its Theological relations, after the publication of the Bridgewater Treatise, and the other able works recently added to the common stock of scientific knowledge, and to the arguments for design in creation, as deduced in the living world. The magnificent and inexhaustible department of inquiry, to which the name of Palæontology is applied, has been so ably investigated, and so admirably described by the Rev. Professor Buckland, and some other eminent authorities, that a brief résumé of the theological evidences derived from it, is all that appears suitable to the plan of the following Essay. And two highly accomplished authors in particular, have lately so ably, and so fully considered and arranged the arguments which prove that the discoveries of Geology,—startling as they appear,—perfectly accord with the statements of the inspired Record, properly understood, that those arguments need not be gone through in the following Essay—which on this point will be confined to the consideration of their nature and general results, and it will be a fundamental principle in the argument, that Scripture

does not interpose any bar to the inferences of Geology, or prescribe any limit to the deductions of science.

While the attractive department of geological inquiry which relates to fossil organic remains has been so satisfactorily considered with reference to the arguments for Design in Creation, and to the illustration of the Creator's Beneficence and Power as exhibited in these monuments of systems immeasurably anterior to our own, it is to be lamented that the mineralogical structure of the globe has not equally been appealed to for evidences of this exalting kind—evidences of which that vast department of geological inquiry furnishes so inexhaustible, so instructive, and so interesting a source. The Author of the present Essay would gladly have directed his humble endeavours to aid in supplying the deficiency which must be acknowledged to exist in this respect—a deficiency which he fears will be too apparent in his own work;—but his opportunities for gratifying an inherited and deeply-implanted taste for natural science, and for cultivating the splendid department of research which forms the subject of the present Essay, are too limited and too few to give him the means of treating those arguments as they deserve. The subject of the following work has been studied, and its pages have been composed by him, in moments appropriated with zeal, but stolen with difficulty from the severer studies and duties of a profession which of itself calls for almost exclusive devotion—a profession,

to advancement in which, the possession of a taste for the ennobling pursuits of science is fortunately no longer a bar; but in which, nevertheless, the author, as a young student who has his own fortune yet to make, is called on to renounce, for at all events the earlier years of its pursuit, that practical cultivation of the varied and extensive objects of geological inquiry to which his inclinations and his conviction of its importance would otherwise lead. In these circumstances therefore, he hopes that a claim will be presented on his behalf for the indulgent reception to which he respectfully commends this little work.

In conclusion, it remains for the author to make an observation which he feels to be necessary, in consequence of the similarity apparent between the recently published work of the Rev. Dr. Pye Smith on the "Relation between the Holy Scriptures and some parts of Geological Science," and the present Essay, in regard to some features of the design, to some of the arguments employed, and to some of the points taken in the discussion. The author begs leave therefore distinctly to state, that nearly the whole of the following pages had been written before the publication of Dr. Smith's work, which the Author had not the good fortune to read until within the last few weeks, nor did he ever attend or read reports of the Rev. Dr. Smith's lectures on the subject. He might be justly proud of any community of thought with so learned, so pious, and so able an authority. Without however presuming to flatter

himself that any such analogy has in any point existed, he cannot but perceive that the prior appearance of the able Treatise of the Rev. Dr. Smith, would be very likely to injure the recognition of the author's own claim to the merit of any originality in his plan, and mode of treating the subject of the following pages, were he not to impress this statement on the reader's attention. It is at the same time a grateful duty to acknowledge, that from the perusal of that work he has derived considerable pleasure and instruction, and has, as it will be seen, availed himself, on the final revision of the manuscript, of the advantage also of introducing many appropriate extracts from that highly talented author.

LONDON, 1840.

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INTRODUCTION.

Chapter I.

The subjects of Geological inquiry are among the most magnificent that science has opened to the contemplation of the human mind, and their importance is admitted by all persons who are acquainted with their nature and results, and is sufficiently attested by the very exalted rank which Geology has attained in the circle of inductive science; as well as by the fact that it receives the sanction, the regard, and cultivation of eminent divines, and of persons the most distinguished in worldly rank, in piety, in learning, and in scientific attainments.

We cannot wonder that Geology has, in the course of a few short years, nobly vindicated the exalted nature, and established the validity of its claims, when we reflect that it is adorned by results of the most instructive and important character, is sanctified by the sublime tendency and relations of its truths, and is inherent with all the attractive distinctions of original discovery. That while

Astronomy has taught us the glories of the universe, Geology has opened to our contemplation the wonders of the globe. That while the one science has exhibited to our astonished gaze, worlds beyond worlds throughout the regions of space, the other has demonstrated the existence of successive orders of animated creation upon our planet, in ages preceding the era of the human race. That while Astronomy has declared that the stars which adorn the ethereal firmament are the centres of planetary worlds, and that systems invisible to the unassisted eye exist throughout the immensity of space, in number inappreciable by human computation, Geology has discovered upon our own planet, and has restored, to the wondering contemplation of man, the fossil monuments of systems of nature, which were created, and which passed away from the globe before his race were placed upon its surface; and the monuments of the creation and extinction of successive races of animated forms, which "are as the stars for number," and the fact of whose prior existence on our planet would have been unknown but for geological researches. And that while Astronomy affords sublime illustrations of the Creator's power in the most stupendous of His works, the researches of Geology, penetrating the obscurity of primeval time, demonstrate, throughout the records of incalculable ages, and throughout the endless varieties of organic forms which no longer belong to the kingdoms of animated nature, the

immediate operation of the same Almighty power that Astronomy traces in the distant glories of the planetary sphere, as well as the constant exercise through all past ages, of the same beneficence and wisdom that are displayed throughout the range of existing creation.

The subjects of geological research are thus invested with features of the highest curiosity and interest. They have restored for our contemplation the monuments of primeval worlds. They have acquainted us with so much of the ancient history of our planet as time has not wrapped in the obscurity of primeval antiquity—they have taught its immeasurable duration, and the fact of its surface having supported, in succession, many different systems of animated creation which are no longer continued in the ranks of existing nature.

But in the disclosure of these results, the discoveries of geological science have unequivocally opposed the interpretation hitherto placed on the Mosaic text, and the doctrine, as well as the chronology which that text *had been represented to teach*, in reference to the antiquity of the earth, and of animated creation. And inasmuch as the conclusions of Geology claim, upon decisive and unavoidable evidence, an immense antiquity for the earth, demonstrate a repeated peopling of its surface with various tribes of organic life, in ages immeasurably anterior to the creation of mankind, recognize, therefore, the existence of death in the animal kingdom

before the fall of man, and fail to exhibit any traces of the Deluge recorded in the Mosaic text, it is evident, that opinions early received, widely entertained, and reverentially cherished, whose long reception has associated them with the sanctity of the text itself, have been unequivocally contradicted and shaken by the self-evident testimonies deduced from nature, in the progress of geological induction.

Due regard has not been had to the important reflection which is thus expressed by a most eminent prelate, the Bishop of London, viz. that, "as we are not called upon by Scripture to admit, so neither are we required to deny, the supposition, that *the matter without form, and void, out of which this globe of earth was framed*, may have consisted of the wrecks and relics of more ancient worlds, created and destroyed by the same Almighty power which called our world into being," &c. Sermons by Dr. C. J. Blomfield, 1829. The force of this reflection has been perceived by many eminent Christians, who have come to a similar conclusion upon a merely philological consideration of the sacred text, apart entirely from the influence of geological knowledge. And it is worthy of observation, that the prior existence of created matter, before the commencement of the epoch recorded in the first chapter of the Book of Genesis, was regarded as probable, and as a justifiable supposition, by the fathers of the Christian Church. "And whatever geologists may discover," says a rev. Presbyterian minister, "respecting the

antiquity of this globe of earth, and the revolutions that have taken place upon it, revelation stands untouched—it leaves room for them all; although it furnishes no information respecting them further than a brief description of the condition in which the last of these revolutions prior to the existence of man, left it." . . . "The Bible," continues this learned and pious Christian,—"has nothing to fear from the closest examination of natural objects, provided it be permitted to speak its own language; but it has every thing to fear from its mistaken friends substituting their own views of its statements, for its infallible dictates." Use and Abuse of Creeds, &c. London, 1836. pp. 66—68.

Those enlightened and discriminating minds which have been engaged in the pursuit of science, and are the best acquainted with the principles of scientific investigation, as well as the best qualified to appreciate the value of the evidences presented in the fossil world, and their actual bearing on the inspired record, are convinced of the perfect harmony of physical and revealed truth: but persons unacquainted with the nature of the evidences presented in the researches of Geology, and unwilling to be convinced of the consistency with the sacred text of doctrines opposed to the interpretation *they* had been accustomed to place upon its language, oppose, with all the mistaken zeal of cherished prejudice, the reception of Geological truths.

It is much to be lamented, that persons who take this method for the vindication of the opinions which they have been accustomed, without reflection, to adopt, should not have waited to obtain more accurate information on the subject, and should not, at all events, have hesitated to afford the unreflecting, and the unbelieving, an opportunity of regarding the sanctities of Scripture, as in conflict with truths to which, from their very nature, conclusions derived from any other source must necesssarily yield.

It should have been recollected that most satisfactory evidence has been adduced to shew, that the Holy Scriptures have received on these subjects an unwarrantable interpretation; and that by receiving that interpretation, the sacred text *has been represented to convey* a doctrine as to the ancient history of our planet, and of its early inhabitants, which the researches of science have unavoidably opposed, and have actually demonstrated to be untrue. That interpretation having been placed on the Mosaic text, has, by long reception, become naturally, but very unnecessarily, associated with a character of sanctity, and even of fundamental importance to religion, although an unprejudiced examination would have shewn, that the testimonies of nature and of revelation being derived from the same source, must necessarily be in harmony, and that the apparent discrepancy could alone be attributable to the ignorance, imperfection, or error under which

that interpretation had been formed by man. And independently of the impossibility of an ingenuous mind submitting to retain a contradiction, and to allow the sanctities of religious faith to be perilled by even a semblance of conflict with scientific truth, it is extraordinary that the supporters of the hitherto received interpretation have not reflected, that in the one case, viz. by the received interpretation of the text, they confine the Divine system of creation, and the operations of the Creator, within a very limited, because a very artificial range. That the supporters of that interpretation are thereby taught to regard the globe, with all its different mineralogical characters, and the varied systems of animated nature, by which Geology proves it to have been, and observation sees it to be, adorned, as the sudden result of His creative power, and as having had existence for a limited period only, a period of six thousand years; to regard the existing system of animated nature as *the only system* commemorative of His power, His wisdom, and His goodness; and, by attributing all the varied monuments of the globe to the rapid formation of a few hours, to trace but *one exercise* of stupendous power, but *one testimony* of benevolent adaptation. Nay more, they are by that interpretation called on to reject the evidence of the human senses, to deny the inevitable results of all past experience, and to violate all principles established in physical science. By that interpretation they are in fact called on to believe an

absolute, an unquestionable impossibility, viz. that the varied strata of the globe, enclosing, be it remembered, the fossil remains of successive creations, and unquestionably recording the lapse of vast periods of time, were of cotemporaneous formation. They are thereby yet further called upon to "set limits to the power of GOD" in a most presumptuous manner, and to a degree, the consideration of which ought alone to determine the rejection of such an interpretation of the text. They are by that interpretation called on to believe that the great and super-human work of creation proceeded upon the principles, and with the incidents of human workmanship. By the doctrine of the six succeeding and cotemporaneous days, they are taught to believe that the Almighty Architect of the globe "rested" not only "the seventh day," but, the "evening and the morning" which is stated to have intervened between each new or succeeding effort of His power, when we know that He had but to command, and "it was so," to will, and "it was done." They are yet further called on by such an interpretation, to believe that the Divine Author of all wisdom, benevolence, and designed adaptation, created animated beings when the earth was not adapted for their habitation, and incapable to afford them support; and, by associating the creation of animals and plants with the period of the original creation of the world, the literal interpreters of the text are unavoidably condemned to believe an impossibility,

and the great improbability also, that the beneficent Creator made animals and plants when they could not have existed on the earth. The received interpretation not only "sets" these impious "limits to the Almighty power,"* the wisdom and goodness of GOD, but is contradicted by the evidences of nature to the fact that animated beings were not of contemporaneous origin, that all their four great divisions even, did not co-exist upon the globe, and that certain orders and genera characterized distinct periods, extending over a vast duration of time.

In the other case, viz. by the splendid truths of the everlasting and unsophisticated monuments of nature, man, to whom, to whose very race, a brief period of existence is allotted on the globe, is enabled to contemplate the operations and results of creative design, benevolence, and power, in the memorials of periods, in comparison with whose duration that of received cosmogony dwindles to a day. He is, too, inevitably assured that all things had their "beginning" in the *fiat* of Omnipotence. He is equally convinced that, "in the beginning GOD created the earth," — that "without Him, was not any thing made that was made." Instead of *one* exertion of Almighty power,

* The language of an anti-geological writer, who insists that the researches of Geology "set bounds" to that Almighty power, the manifestation of which, they on the contrary, prove to have been without limit.

he is enabled to contemplate the memorials of its continued exertion; instead of a six thousand-years' experience of the superintending government of GOD, he is enabled to trace it through periods, the duration of which was too vast for the human mind to estimate; he is conducted to the archives of a primeval world, to the monuments of systems of nature, the existence of which no other means short of revelation could have announced, monuments of which revelation is not only wholly silent, but could not have been designed to speak; and the actual features, the exalting and instructive character, the deep and paramount interest, the resplendent grandeur, of which, none but Geology could exhibit or announce. Instead of a belief that animated beings were created in conditions of the globe when it was impossible they could have existed, the conviction is impressed that a benevolent adaptation of organic life to the particular conditions of the globe, prevailed throughout all its incalculably lengthened periods.

With justice, therefore, may it be affirmed, that Geology has opened to our contemplation, views of the Creator and His works far more noble, consistent, and exalted, than those artificial doctrines which they have proudly and resistlessly superseded, and compelled to yield to more noble views; and that it is as unreasonable to question the conclusions of geological science, because they are opposed to those favourite and long received doctrines, as it

would be to abandon the present acquisitions of science and of reason in Astronomy, Chemistry, or any other branch of natural philosophy, because they surpass the knowledge attained, or vary the theories taught by earlier philosophers.

Since geological researches can boast results and objects so magnificent and so exalted, we must, indeed, not only wonder, but must feel the deepest concern when we reflect, that notwithstanding the surpassing merits of Geology, the perverseness and the obstinacy of human prejudice is such, that even this splendid and important branch of natural philosophy, this fertile tributary to the evidences of natural theology, is regarded by persons unwisely prejudiced in favour of their own interpretations of Scripture, as being inimical to religion, as subversive of revelation, and consequently as a "dangerous" and unworthy object of pursuit. The claims of geological inquiry are, indeed, so firmly established, and so well appreciated wherever they are known, that Geology is not called upon to vindicate its claim to the regard and the distinctions it commands, nor have the interests of geological science, the slightest reason to dread the combined efforts of the unhappy prejudice, and in some cases obstinate fanaticism, which, under the banner of Scripture, are presumptuously, but vainly opposed to its conclusions.

The mistaken writers who array their own favorite interpretations of Scripture, and their own incompe-

tent expositions of the sacred text, against the incontrovertible truths established in geological researches, are not content with the silent enjoyment of their own opinions, nor possessed of sufficient humility to pray for grace and knowledge to enable them to perceive and understand the sublime physical revelation which the labours of geological science have brought to light, and the necessary agreement of that revelation with the one contained in the Holy Scriptures; but they presume, and in some cases evidently without the qualification of any geological knowledge, to interpret the records of the fossil world, to define the meaning of the scriptural narrative, to take the *really* "dangerous" ground of representing the well established conclusions of Geology to be opposed to the announcements of revelation; and then, with the view of evading the difficulty they have thus, themselves created, traduce the merits and the authority of geological research, and denounce it as the "new weapon of philosophical scepticism and infidelity."

This is a most uncandid course; and in adopting it, the anti-geologists little calculate on the mischief they produce to the cause which I will give them the credit of wishing to support. For it is certain that multitudes of persons who have not become acquainted with the researches of Geology, and therefore are not prepared with the means of judging correctly for themselves, are liable to be misled by these efforts of anti-geologists, and to form very

erroneous conclusions—to decide, perhaps—(on the strength of the authoritative character which by common reputation they know the evidences of Geology to possess)—very unfavourably to the Divine authority of the sacred text; or, perhaps, to decide against evidence altogether, to hold a faith which is contradicted by the unquestionable certainties of science, and to commit the folly, nay, almost the sin, of rejecting the exalted testimonies adduced by the researches of Geology.

The Christian philosopher must deeply lament either of these results: and although the science of Geology is too justly and therefore too firmly established to need any defence, so far as the interests of the science are concerned, and is impregnably fortified against the attacks of those prejudiced and partially informed writers, who presumptuously call on the discoveries of science to bend to their own narrow interpretations of the sacred text, it is so valuable and important, and its cultivation is so exalting and instructive, that it becomes a public duty to vindicate the merits of geological research; to make known the inherent elements of theological instruction whereby Geology has tended to confirm, so far from weaken, the fundamental doctrines of natural religion, and the announcements of revelation; to enforce the important facts with which the geologist is familiar, viz., that the venerable monuments of the fossil world present conclusive demonstrations to the arguments for design in creation,

and to the constant presidence of a beneficent and all-powerful Creator; and that in the fossil remains of the various systems of animated nature, which flourished, and passed away from the globe, in ages long preceding the creation of man, the same evidences of adaptation, of skill, and wisdom, are exhibited, as we trace throughout the varied range of the creations which are cotemporary with the human race; to demonstrate by a consideration of these results, the inestimable value of geological research; and to extend the conviction of its importance to religion, in having carried back to primeval systems in nature,—systems, of which revelation is, consistently, silent, and to which no other methods of inquiry can attain—the evidences contributed throughout existing creation, to "the Power, the Wisdom, and the Goodness" of Him who made, who sustains, and still supremely governs, the mighty whole! And thus to shew that the conclusions of Geology are not only an essential support to theological doctrines, and are not only "incapable of opposing any religious principles, or of supporting any sceptical views;" but that they actually furnish from the department of nature whence such testimonies were the most to be desired, conclusive demonstrations of the eternal Being, and the perfections of GOD; and concurrent arguments in favour of the sacred character awarded to the Scriptures throughout the Christian world. The results which have attended the recent cultivation of geological re-

searches entitle Geology to take in the discussion this altered ground—that whereas, in the earlier periods of the science, the banner of religious faith was unfurled in the crusade against its doctrines, Geology now becomes the champion of religion as well as of scientific truth, and arrays its evidences in opposition to the suicidal efforts of prejudiced hostility. A knowledge of the reconciliation which the anxious, the sincere, and unremitting labours of Christian philosophers have succeeded in establishing between the unquestionable testimonies of science, and the declarations of Scripture, is the more important, as the position taken for the purpose of sustaining the received interpretation of the sacred text, against the evidences of science, have been construed by the thoughtless and the wavering, most unfavorably to the sacred interests of religion, and consequently of mankind; and have impeded the general appreciation so much to be desired, of the great result by which the researches of Geology have been crowned, namely, the illustration of the perfections and the eternity of GOD, in a department of nature which renders such evidences of incomparable value, and invests them with peculiar and impressive force.

Chapter II.

General View of the Nature, the Objects, and the Relations of Geological Research.

There is not any branch of Natural Philosophy in which science and observation have achieved results more astonishing in their character, and replete with all "the splendour of original discovery," than are those which characterize the researches of Geology; nor any department of nature in which the labours of scientific research have disclosed phenomena more interesting and instructive than those of Geology, more completely new and unexpected, or more important in the conclusions to which they lead. By the lights of geological science, we are enabled to deduce from monuments, the very existence of which would have remained unknown and unintelligible but for its researches, the history of our planet, from ages to whose remote antiquity no other inquiries can possibly attain, and the most clear and only certain narrative of the events by which it has been affected, as well as of the myriads of animated forms by which its ancient surface was peopled during "the long succession of ages" which preceded not only the commencement of human records, but the creation of the human race.

In reference to these discoveries, the Rev. Professor Sedgwick, in his Discourse on the Studies of the University of Cambridge observes, that, "by the discoveries of a *new* science (the very name of which has been but a few years engrafted on our language,) we learn, that the manifestations of God's power on the earth have not been limited to the few thousand years of man's existence. The Geologist tells us, by the clearest interpretation of the phenomena which his labours have brought to light, that our globe has been subject to vast physical revolutions. He counts his time not by celestial cycles, but by an index he has found in the solid frame-work of the globe itself. He sees a long succession of monuments, each of which may have required a thousand ages for its elaboration. He arranges them in chronological order, observes in them the marks of skill and wisdom, and finds within them the tombs of the ancient inhabitants of the earth. He finds strange and unlooked for changes in the forms and fashions of organic life, during each of the long periods he thus contemplates. He traces these changes backwards, through each successive era, till he reaches a time when the monuments lose all symmetry, and the types of organic life are no longer seen. He has then entered on the dark age of nature's history; and he closes the old chapter of her records."

It is not on account of their curious novelty and surpassing interest alone, that the researches of

Geology have become so eminently the object of scientific attention and esteem, and have taken so distinguished a position among the most lasting and valued acquisitions of reason and philosophy. Those researches have not merely opened to our view new scenes of wonder and astonishment in the Creator's works; they have not merely announced the occurrence, and acquainted us with the nature, of changes and revolutions, which, in periods too remote for human calculation, affected the globe to whose now comparatively peaceful and fertile surface mankind, and the cotemporary inhabitants of the earth, have succeeded: nor have geological researches merely exhibited to us the pre-existing conditions of our planet, when inhabited by various animals of wondrous structure which have long ceased to occupy its surface, and by "plants of which no living species are known;" or merely called from their long repose in stony sepulture, to our own astonished gaze the very generations which lived in periods separated by many thousand years, not only from the present age, but from the very creation of mankind: generations of which, in the poet's language, it may be said,

"A *sacred* band, comes stealing on."

For it is undoubtedly and incontrovertibly true, that in the fertile and extensive, the previously unexplored and time-hallowed, range for inquiry and contemplation which the researches of Geology have opened in the wonders of the fossil world, a

vast and important sphere is added to the dominion of religion, and thus to the means of human exaltation; and that religion has derived an extension of its empire, and the best confirmation of its truths, among the ruins of ages and creations which preceded the existence of any revelation, in sources independent of the Mosaic writings, unconfined by the limits of existing creation, and extending to systems far earlier than our own; and from sources, therefore, which were the least expected to furnish those results. And the researches of Geology, it has been truly said, are calculated to inspire the most affectionate veneration for that Great Being who has made even the convulsions of the material world subservient to the happiness of His creatures.

Geology can proudly turn to these results; for it has been, and is the glory of its own unrivalled and splendid researches, to trace through the relics of former and now extinct creations, the most convincing proofs of a constantly superintending design; to shew that the organic forms which inhabited the earth "many thousands, and perhaps, tens of thousands of years" before its occupation by man, are connected with the structures which now inhabit its surface by one leading feature—that of similarity in the principle of their construction;—a feature which connects the inhabitants of the globe in most widely separated periods, the intervals between which must be an eternity as compared with the whole past existence of mankind upon the earth,—as parts

of one great plan, and in natural and logical consequence, as creations of the same Almighty hand.

"It is no wonder," observes the Rev. Dr. Smith, "that Geology has risen so high within but the last fifteen years, and has attracted to it the most gifted minds in this and other countries: for it is based upon the evidence of sense, in the laborious and protracted examination of mines, mountain regions, and less dangerous places without number; and it demands, in order to its successful cultivation, an acquaintance with at least the principles of Chemistry, Electricity, Mineralogy, Zoology, Conchology, Comparative Anatomy, and (as the papers of Mr. Hopkins and Sir J. F. Herschel have recently shown) of the sublimest Mathematics. Thus Geology maintains relations with the whole sphere of natural knowledge; and above all it bears a most important reference to Theology and Biblical studies, that we may know truth, and maintain it, against both well meaning believers and ill meaning unbelievers, and may magnify 'the wondrous works of Him that is perfect in knowledge.'"

It will be seen, therefore, that to Geology the praise is due, and has been justly awarded, that it has enlarged our idea of the operations of the Deity in respect to *duration*, in the same degree that Astronomy has done in regard to *space;* and that it has opened fields of research and contemplation, as wide and as grand as those that Astronomy itself presents: to which noble science Sir John Herschel

observes, that " Geology, in the magnificence and sublimity of the objects of which it treats, undoubtedly ranks next in the scale of the sciences." And " whilst (in the language of Mr. Lyell, the eminent geologist,) " the discovery of *other systems* in the boundless regions of space was the triumph of Astronomy, it has been the meed of geological research to trace *the same system* through various transformations;—to behold it at successive eras adorned with different hills and valleys, lakes and seas, and peopled with new inhabitants:" and moreover to afford us the satisfaction of finding, that while in existing nature we are continually surrounded by evidences of the adaptation of the earth's present surface to the system of animated nature by which it is adorned, we have in the fossil world the means of carrying these evidences of adaptation further. For, as geologists, " we learn, that many former states also, have been equally adapted to the organization and habits of prior races of beings; that the disposition of the seas, continents, and islands, and that the climates also, have varied; that the species of those races likewise have been changed, and yet that they have all been so modelled on types analogous to those of existing plants and animals, as to indicate throughout, a perfect harmony of design and unity of purpose." And if so much interest and instruction attend the cultivation of Natural History and Zoology, the studies that relate to animals co-existent with mankind;

how much greater must be the interest attached to the contemplation of those which preceded the existence of our race, and which possessed the earth ere man became, with their successors, the tenants of its surface. And the beautiful examples of mechanical contrivance by which every existing species of the animal creation is adapted to its peculiar state, being demonstrated, by Geology, to have had existence from the very commencement of animal life upon the globe, the geologist therefore (in the words of the Rev. Professor Buckland) "claims for the Author of the extinct fossil forms under which the first types of such mechanisms were embodied, the same high attributes of wisdom and goodness, the demonstration of which exalts and sanctifies the labours of science in her investigations in the living world."

Such then, is the nature of the results which distinguish and exalt the researches of Geology, viewed in their auxiliary relation to Natural Theology and to Religion.

The rich fields for scientific investigation and the materials of human advancement, have also received the most valuable extension and acquisition in the wide and exalted sphere which the researches of Geology have opened to our contemplation. For, on viewing those researches in relation to other branches of science, we find that many of the characteristic features from which the sciences of astronomy, of comparative anatomy, of zoology, and of botany, and the science of chemistry also, derive much

of their value, are united in the science of Geology; the extension of which is not only directly related to their advancement, but is reciprocally illustrative and beneficial to those branches of science. And in the cultivation of comparative anatomy, of botany, and of zoology, we are enabled, by geological research, to extend those important branches of learning to the fossil remains of the earlier systems of nature which investigations have disclosed; while in the study of inorganic nature, in the cultivation of chemistry and mineralogy, the most important aids are derived from geological science.

Nor are these the only advantages which result from its cultivation. Every dweller on the globe is interested in obtaining a knowledge of its structure, of the substances of which it is composed, and of the order in which its mineral treasures occur, not only on account of the instruction and interest which result from the inquiry, but of the practical importance of such knowledge. Thus in agricultural pursuits it is of the highest value—in the search for coal, in the operations of mining, and in the practice of architecture, it is called into requisition, and in a variety of other pursuits, involving objects of the highest national importance, a knowledge of the order and succession of the strata is absolutely essential. Besides, we naturally feel interested to know the events which have happened in the localities we inhabit; more particularly as those events are associated with the mineralogical struc-

ture of the globe, in which we are all so directly interested, and as their results are disposing causes of such obvious power, in regard to the character, habits, pursuits, and conditions of the terrestrial inhabitants.

But a still more lofty character attaches to Geology, when we reflect that it enables us to trace the Deity, as it is our chief concern to do, in the planet which we inhabit. "It is" says Dr. Watts, "a truly Christian employment to derive some instruction or improvement from every thing around us, to fetch down some knowledge from the clouds, the stars, the sun, moon, and revolutions of the planets,—to dig, and draw up some valuable ideas from the depths of earth and ocean, from minerals and metals, and from all nature." For this ennobling and instructive pursuit, the most fertile sources are unfolded in Geology, it furnishes inviting, useful, and sublime materials of discussion, affords novel and peculiar objects of interesting contemplation, and above all, its cultivation tends to exalt our ideas of the power, the wisdom, and beneficence of the Almighty, as, in addition to the many important relations of Geology, its study not only *demonstrates in new forms* the operations of the Creator,—the evidences of which it is the highest result of astronomical science, and of the examination of organic structures in the existing world, to furnish,—but also, by "extending those evidences into a former world," declares that we "can

read *there* the same hand-writing," *there* the same system and contrivance.

At the present day all persons must be aware that the most conclusive evidences of design in creation, have been deduced by the science of comparative anatomy in the varied structures of the existing world. But, (as observed by a talented reviewer) since those persons who are not professional anatomists, are deterred from the practical study of animal bodies and their functions, it is too true, that multiplied and satisfactory as are the repeated proofs of wondrous skill, and benevolent adaptation, which surround us in the structures of the living world, and in the varied functions of animal physiology, these "miracles of power" are not appreciated as they ought to be by every mind. But "the case," observes that accomplished writer, "is wholly altered when we are introduced to fossil remains, and examine the structure and functions of animals that inhabited the earth long before its occupation by man. With them, nothing mortal has the least association. Time has invested them with a hallowed and mystic aspect; the green waves have washed them in their coral bed; and after ages of ablution in a tempestuous ocean, the ordeal of a central fire has completed their purification." The bones, and the integuments, and the meanest products of animal life—enclosed within, and metamorphosed to the very substance of the rock—have "thus become sainted relics which the most

sensitive may handle, and the most delicate may prize."

"Thus ennobled in its character, the natural theology of animal remains appeals most forcibly to the mind, even when we consider these remains only as insulated structures dislodged from the interior of the earth. But when we view them in reference to the physical history of the globe, and consider them in their true light, as the individual beings of that series of creations which the Almighty has successively extinguished, and successively renewed, they acquire an importance above that of all other objects of secular inquiry."

I cannot do better than conclude these remarks with the following observations of a most accomplished geologist and philosopher:—

"We are not then, in a different system of nature, properly so called, from those (systems) which have been created, and have been suffered to pass away before the birth of man; but, in a forward part of the same system, whose law of progression is fixed, though from time to time the signification of the terms varies. The full and complete system of organic life now on the globe, includes all the effects of land and sea, warmth and cold, divided regions, and all the other things which are the diversifying causes of nature; and it is no wonder, if before this land was raised from the deep, and the present distinction of natural regions was produced, there was not the same extreme variety of natural

productions. Till that variety was occasioned on the globe, it was not the fitting place for intellectual man that it now is; for, surely among the other uses and co-relations of the visible creation, this is one,—by its inexhaustible diversity and ever-growing newness, to interest, with a perpetual charm, the growing mind of a rational being, and lead him, by a flowery path, to the cultivation of the Divine essence within him which raises him above all that his senses make known; and thus to fit him for the highest contemplation of which he is capable, viz. the relation which he bears to the unseen Author of all this visible material world.

Thus, to the mind of a geologist, nature is one glorious book; one system of appointed and associated law, independent of time, and exempt from change, but operating under conditions which vary with time and place. The past has prepared the present; the present explains the past, and points to the future." Professor John Phillips's Suppl. Note, in Professor Powell's Connexion of Nat. and Div. Truth. p. 309.

Chapter III.

Summary of the Geological Discoveries which establish the high Antiquity of the Earth; and General View of the Evidences presented by the varied Strata and Organic Fossils, and Reasons for assigning to its Duration a far more remote Antiquity than the Era supposed to be fixed by the Sacred Narrative.

From the consideration of the distinctive merits of geological research, of its noble and exalted tendency and results, and of those theological evidences disclosed in the study of the fossil world, which assure us of its value to religion, and which render the monuments of the globe a revelation of the Creator, of His eternal being, His wisdom, beneficence and power, we now pass to the consideration of those evidences disclosed in geological investigation which seem opposed to the narrative contained in the scriptural revelation of His will; assured *à priori*, that those evidences cannot by possibility be at variance with the word of God properly understood, or do otherwise than corroborate and strengthen the foundations and the sanctities of religious faith; and consequently, that they do not furnish the slightest occasion for alarm

to even the most jealous advocate for the truth of of the Inspired Record, or establish, with reference to that record, any other conclusion than that it has received an erroneous interpretation; leaving to philological considerations the satisfactory achievement of establishing, that the doctrine which the Mosaic text has been represented as teaching is not the only doctrine fairly deducible from its language.

Before entering on the consideration of the proofs contributed by the researches of Geology, it may be proper that I should here suggest a few reflections on the nature and force of geological evidences.

To any competent and unprejudiced observer it must be clear, that the evidence presented in Geology is, from its very nature, most conclusive and satisfactory. Indeed, the results established in the researches of what are termed the exact sciences, cannot boast more demonstrable truth and certainty than Geology is entitled to claim for its established conclusions. Geological truths demonstrate themselves to be such, by, in many cases, the self-evident testimony immediately rendered apparent by the perception of the senses themselves; and where the conclusions of Geology do rest upon inference or deduction, the process is as rigorous and as exact as that employed in the science of geometry, or in any other branch of the mathematics, and as logical as the principles of the strictest reasoning. The conclusions of Geology are indeed deduced by the most rigid process of logical

induction from phenomena, which carry with them an undeniable evidence, and it is as impossible to entertain a reasonable doubt of such conclusions when once ascertained, as it would be to deny any other evidence present to the senses. And as regards the validity of the conclusions thus deduced, it is to be observed, that the inductions of Geology are not the calculations of one set of observers, nor are they made on any one natural fact, or on any one series of phenomena observed, but are the concurrent and the consistent result of distinct and independent observations—of observations made in different localities, upon different phenomena, and distinct and separated instances of the same general formation, made by different and independent observers, observers of consummate skill, and habituated to patient research, and whose qualifications for correctly observing and judging, as well as their credibility, are attested by their eminent attainments in the several branches of science, by their general ability, long experience, and high character; and the correctness of whose observations thus independently made, is further guaranteed by their being subjected to renewed collation, comparison, and examination by other well qualified observers, by geologists, and by minds of acute perception,—in many cases previously opposed to the conclusions which thus convince their own reason,—and these observations and conclusions are afterwards subjected to public consideration, and thus again exposed to

correction, were there opportunity for it. And the evidence cannot be weak, or the induction doubtful, that has led the most eminent Christians and Philosophers to "read their recantation" of opinions they had adopted, and long warmly cherished.

It has been truly observed, that we readily give implicit credit to the calculations of the immortal Newton, Laplace, Bradley, and Herschel, made in a sphere where their conclusions necessarily rest upon calculations alone, and as necessarily want many of those present and sensible corroborations and safeguards which attest the validity of geological conclusions, while at the same time we deny the inferences and conclusions established in geological research. We admit the plurality of worlds in the Siderial system, but deny the plurality of creations upon our own globe—and this, although the plurality of worlds is established by reasonings not more convincing than those which enforce the conclusions of Geology. And since those conclusions are thus supported, thus sanctioned, and thus guaranteed, and since they in addition "speak for themselves," and require not the elucidation of merely arithmetical and mathematical evidences, and moreover are not based on arguments from analogy only, why is it that we do not give as implicit credence to the facts and reasonings of Geology? Can the most zealous opponents of geological truth bring to their aid one reason to justify this glaring inconsistency, this positive injustice? To the present hour they have been unable to

impeach one established conclusion of Geology, or to bring against the validity of its irresistible evidences one pretence of an argument, but that they themselves believe otherwise, have been taught to interpret the doubtful announcement in the Book of Genesis otherwise, and that geologists and all scientific observers, whose reason is convinced by the force of geological evidence, to the necessity and the justice of a different view, are guilty of heresy, and chargeable with infidelity towards revelation — a revelation to whose Divine Author nevertheless geologists devoutly trace all the evidences of creative skill and wisdom, with which their grand and noble researches render them familiar in the fossil world, and whose fundamental announcements those researches ever tend most impressively to confirm.

I now proceed to a general statement of the body of evidence, by which the antiquity of the earth is established, and of the facts which, having been unfolded by the researches of Geology, prove that no limits can be assigned to the periods occupied in the past transitions of the globe, or in its possession by different orders of organic beings, peculiar to its different conditions.

The evidences which demonstrate that the earth has existed, and has undergone an incalculable number of changes, through periods too vast for human computation to define, are derived,—first, from the series of strata and the general phenomena of structure presented in the globe, or rather in

that crust of the globe which is all that man is enabled to observe; and, secondly, from Palæontology, the study of the organic remains with which the stratified formations more or less abound. Their aggregate thickness is not less than ten miles.

The evidences from stratification are first to be considered. Their force is derived from the slowness with which the materials composing these vast and extensive formations have accumulated; and knowing that the process of accumulation of materials beneath the sea is now extremely slow, we have no reason whatever to believe that the same operation—(for by the same operation have most of the stratified formations been produced)—required less time in the ancient formations of the globe.

The lowest point at which these evidences commence, or in other words, the earliest appearance of stratification is in the Gneiss rocks. These can have acquired their structural condition at the rate of a few inches only, in a hundred years, and their thickness certainly averages some thousand yards.

The Mica-schist and Slate Rocks of the Cambrian and the Cumbrian systems, which are the formations next in order, are also derived from the gradual accumulation of their materials. These rocks extend to between *three and four miles*, and their process of accumulation having been extremely slow, they furnish unequivocal demonstrations that vast

periods of time have been occupied in their formation.

To these succeed the great series of accumulations of Transition slates, sands, and limestones, forming that extensive system to which the researches of Mr. Murchison have attached so much interest, and invited such general attention, viz. the Silurian system, and which seems to contain the links of connection between the superincumbent old red sandstone formation, or Devonian system, and the inferior unstratified rocks, to which the general denomination of primary rocks was formerly applied. The thickness of the Silurian system may, I believe, be stated at from a mile to a mile and a half. Mr. Murchison has, in his splendid and important work on this remarkable system, elaborately described its complicated and varied characters, and has well exhibited the irresistible evidences displayed in the Silurian system, of the lapse of indescribable periods, of the occurrence and long continuance of different conditions in the ancient country which they represent, and of the successive changes of condition and relations to adjacent land and sea, to which that country was subjected in the long succession of ages which preceded the deposition of the varied and extensive formations that have supervened in point of time. The memorials of these events in the Silurian district, are the various kinds of stratified rocks associated with this great system; the large body of supervening

drift formation, which in itself furnishes additional evidence of change and differing conditions; and the subordinate or specific boundary lines which separate these varied monuments of early conditions of our globe, these varied parts of a great system itself separated by well defined and infallible characters of distinction, from the subjacent rocks on the one hand, and the vast masses of superior formations on the other. The immense periods of time required for their derivation from older formations, for their aqueous deposition and accumulation, their elevations, destruction, and renewed formation, and their subsequent alteration by volcanic agencies, are too extended to be accurately measured, or even represented, by any methods of human computation.

Such, then, are the conclusions which result from the very remarkable phenomena presented in the whole of this series of strata—"so various, yet so uniform; so vast, yet so connected."

The same evidences of slow and gradual accumulation are repeated in the several members of the next formation, the Old Red Sandstone series, which has an average thickness of several thousand feet.

In the Mountain Limestone, which next succeeds, we find a vast formation of large geographical extent, and frequently upwards of a thousand feet in thickness, chiefly consisting of the coralline and shelly productions of the ocean, deposited and formed in the ancient seas, in waters charged with earthy car-

bonate, and which, in conjunction with the associated coal formations, attains a thickness of several thousand feet. This is the range of the Transition series.

In the next superior formation,—the New Red Sandstone,—repeated evidences of change, and of the lapse of considerable periods are again furnished. The members of this group are varied and distinct, and its thickness averages another thousand feet.

Passing over less remarkable formations, we proceed to a yet more extensive and more highly curious series, one of astonishing thickness, viz. the Oolitic formation. This formation represents an ancient system of both land and sea, and its structure also furnishes decisive proofs of gradual accumulation, through long periods of time, its constituents being successively derived from the ancient seas, and from fresh water, and in some periods cotemporaneously from both. The oolites extend through half a mile in thickness, and everywhere present incontestible proofs of slow accumulation, and testify the lapse of immense periods of time.

The great Chalk System, with its accompanying clays and sands, next supervenes, and separates from each other two different orders of things—forming, or being considered to form, the boundary line where the Secondary formations terminate, and the Tertiary begin. The Cretaceous system extends to a thickness of upwards of one thousand feet, and its

different formations bear evidence of having been gradually deposited, and of that deposition having occupied immense periods of time. The distinct character, evidencing a distinct and different order of things, which is assignable to certain supercretaceous formations of sedimentary rocks, and which marks an interval between the Secondary system, and the associated beds of the lower Tertiary series, supplies a further evidence of the immense period of time represented by this great system of formations.

To these, the Tertiary Series next succeed, and present a collection of marine and freshwater deposits, constituting a series of more than eight hundred feet in thickness. All these formations also, evidence successive deposition, under different terrestrial conditions; and in them all, the gradual process of stratification is clearly marked—and the drift as well as volcanic formations which supervene upon, and are associated with them, and the alternations of marine with freshwater formations, clearly record that different ages and conditions prevailed at the successive eras of their deposition. And relying on the known sequence and consistency of natural operations, it is impossible to escape the conclusion, that some tens of thousands of years must inevitably have been occupied in the production of this single series of formations. The grounds for this conviction, are also strengthened and corroborated by the evidences of volcanic action, which are connected with the tertiary period, and

from which we derive a series of independent and demonstrative proofs of the occurrence of a long succession of physical events during the Tertiary period, which must have required cycles of extended duration. Four distinct periods are clearly marked.

The phenomena of volcanic regions clearly indicate myriads of ages, and the lapse of uncounted periods of time, as well as the occurrence of great changes and convulsions, before the creation of man, and the adaptation of the earth's surface for his abode. The time employed in the production of the phenomena observed in one volcanic district in the south of France, is unequivocally shewn to have extended over some tens of thousands of years. One laminated formation of this volcanic district is calculated to have required a period of eighteen thousand years to attain its actual state.

It has been estimated upon ample observation and calculation, that a single period of volcanic quiescence, during which the strata of coal, shale, sandstone, and limestone, were deposited over the site of the basaltic hill, called Arthur's Seat, at Edinburgh, extended to five hundred thousand years. Maclaren, Geol. of Fife and the Lothians, 1839.

I may here recal the argument of an accomplished and eminent observer, and who was a sincere friend of revealed religion, viz. the late Dr. Macculloch. "Let us," he observes, "contemplate *time* as it relates to THE CREATOR, not to ourselves: and we shall be no longer alarmed at that which the history of the earth demands. Every stratum of rock is

the work of time, often of far more than we choose to contemplate; while, from what we see, we can approximate to that which we know not how to measure. He who can measure, and number the strata from the first to the last, is prepared to solve this question as it relates to the intervals of repose; but to those only, not to those of the revolutions. Let him ascertain the time required to produce a stratum of a given depth; let him seek it in the increase of colonies of shell fishes, in the deposits of peat, and in the earthy deposits of seas and lakes: and he has found a multiplier—not to disclose the truth,—but, to aid his imagination. Who indeed can sum this series? The data are not in our power, yet we can aid conjectures.

"The great tract of peat near Stirling, has demanded (nearly) two thousand years; for its registry is preserved by the Roman works below it. It is but a single bed of coal: shall we multiply it by 100? We shall not exceed,—far from it,—did we allow 200,000 years for the production of the coal series of Newcastle, with all its rocky strata. A Scottish lake does not shoal at the rate of half a foot in a century; and that country presents a vertical depth of far more than 3000 feet in the single series of the oldest sandstone. No sound geologist will accuse a computer of exceeding, if he allows 600,000 years for the production of this series alone. And yet, what are the coal deposits, and what the oldest sandstone, compared to the entire

mass of the strata?" Macculloch's Syst. of Geol. Vol. 1. pp. 506, 507.

Upon these varied formations—these successive monuments of the successive conditions of the ancient globe,—the comparatively recent alluvial deposits, of which the London basin affords an example, have supervened; and on comparing these formations with the vast succession of strata beneath, we cannot fail to be impressed with the very trifling extent of the formations which have been produced during the whole period that has elapsed since the creation of man, and consequently with the immense periods of time, which, by parity of reasoning, must have been required for the production of the vast and extensive monuments of those uncounted ages, that preceded the existence of the human race upon the globe. And as we find a period of six thousand years (according to received chronology) to be represented by the alluvial formations, by the superficial deposits, which contain the remains of existing species of organic forms, and to have passed away in their production; so, we are justified in attributing for each of the differently characterized formations of even the Tertiary series, a similar period of time: and what an amazing series would the product amount to, were we to extend the computation to the varied inferior systems, whose process of formation we know to have been as gradual, as slow, and natural, as that of the Tertiary deposits which separate the existing order of things

from the most recent formations belonging to the ancient world!

The examination of the mineralogical characters of these varied formations, also presents most convincing evidences of immense periods of time.

The distinct and dissimilar characters of the rocks which form the objects of geological investigation, are the most obvious and familiar evidences of different terrestrial conditions and events, of subterranean operations of great magnitude and force, carried on through periods of incalculable duration, and of those rocks having acquired their actual condition by great natural operations, for the exercise of which unlimited ages must be allowed.

The varied rocks which compose the crust of the globe, divide themselves under great classes, as the results of igneous and aqueous agency. The crystalline, volcanic, and intrusive trap rocks, shew that the mineral masses of the globe anciently existed in a fused condition, and necessarily lead to the inference of long periods of time for their cooling, and for the subsequent establishment of a system of things, in which the various supervening strata derived from the dry land and seas were gradually accumulated. The volcanic rocks which exist to so astonishing an amount prove the long duration of volcanic energy in the ancient periods of the globe; and the masses of intrusive trap rock, and the dykes and veins of injected mineral and metallic substances which traverse the solid framework of the

earth's crust, exhibit the subsequent operation of igneous agency, through the long periods of time which elapsed before the earth was prepared by the Creator for the habitation of mankind.

A general view of the phenomena referred to in the following observations of Dr. Smith, affords a conclusive addition to the reasons for yielding to a conviction of the unspeakably vast duration of our globe.

Dr. Smith observes, "The earliest slate rocks, like all other strata, must have been originally deposited in a position horizontal, or nearly so. By subsequent movements,—not one, but evidently many,—they have been raised to all elevations, and bent to the utmost extent of contortion: as is shewn by the lines of stratification. But there is another kind of division, first brought to light by Professor Sedgwick; that of lines of cleavage and intersecting joints, or called by a general term, structural or divisional planes.

"These are productive of signal benefit to the arts and convenience of men; but they involve profound geological and mathematical researches, and their causes can be explored only by going into the deepest night of terrestrial antiquity. Those who are the best qualified to form an opinion, impute this structure to an agency—(call it electric, galvanic, magnetic, or chemical)—connected with the grand and mysterious operations of the terrestrial magnetism, operating upon a scale which we cannot

graduate, of magnitude and distance, and requiring a proportionate vastness of time for its taking effect; probably the same agency that reigns in the wonderful processes of crystallization, from points of invisible minuteness to formations of indefinable greatness: or, some parts of these phenomena may be imputed to the slow action of the heat from below, producing a general and regular contraction of the argillaceous formations; or the cause may be sought in the change of cohesion in masses becoming solid from a state of fluidity. The contraction mentioned is founded upon a known property of argillaceous earth: all these causes act quite independently of the stratification; the jointed structure is found to affect the crystalline rocks also: the stratification contains in itself the evidence of having required periods, impossible indeed to be determined by any assignment of figures, but to which, judging from all approximating evidence, our cycles of time afford none but a totally defective measure of comparison." Dr. Smith, Supp. Notes, p. 404.

Of aqueous derivation, many of the several stratified formations already referred to, present the infallible monuments. Some of them are derived from the ocean, some from fresh-water lakes, or rivers, and their different mineral characters indicate the different conditions under which they were slowly derived.

The presence of foreign and heterogeneous mineral substances in some of these aqueous deposits,—

of granitic fragments for instance, in early stratified rock,—and the heterogeneous characters of others, such for example as the conglomerates of the old red sandstone series, most clearly establish the prior existence of a yet earlier system of rocks, from whence those foreign substances were derived. In the conglomerate rocks these evidences are peculiarly striking, and they record the passing away of innumerable ages in even one of the Transition formations.

Nor do the different mineralogical characters of the yet more ancient system of rocks, present less forcible evidences. For the component parts of the crystalline mass that was formerly regarded as a primary formation, are shewn when chemically separated, to belong to rocks of distinct constitution, and of a separate estate in the mineral kingdom. And we cannot cease to trace the evidences of successive derivations, and consequently to carry back the proofs of the lengthened duration of the earth, while we find in the most ancient crystalline rocks evidences of their compound structure, and of endless chemical combinations. The structure and constitution of the crystalline rocks sufficiently establish the lapse of uncounted ages, and this before any of the supervening formations were deposited. And it is impossible that any mind capable of reflection, can suppose a rock composed of such obviously distinct materials, to have been created in its actual state.

Passing from the different mineral characters of

the substances and strata forming the crust of the globe, to the *causes* by which that diversity was produced, viz. the changes that our planet anciently sustained, and considering also the order of superposition of stratified formations, we are again presented with impressive testimonies of the vast duration of the earth. The most obvious and familiar of these proofs is afforded in the fact, that the actual substrata of the present continents have more than once formed, during considerable periods, the bed of the ancient sea, beneath whose waves, it is incontrovertible that the elevated tracts and mountain regions of the present surface, were once entombed; a vast amount of stratified deposits recording in themselves the lapse of countless ages, have therefore supervened on areas once occupied by the sea:—the mighty element that remains unchanging amidst the perpetual changes of the land, and to which Byron sublimely sang—

> Time writes no wrinkle on thine azure brow,
> Such as creation's dawn beheld, thou rollest now!

This phenomenon is obvious, not only as regards those strata of marine formation which occur the first in descending order, but equally so as regards other series of marine deposits to a very considerable depth, and it cannot be doubted that the interchanges of land and sea have occurred many times. In addition to these events, we are presented with evidence that certain areas on the globe have not only been alternately sea and land, but

have been at one time the ocean's bed, at another dry land, at a distant subsequent period an estuary, then again sea, and lastly once more, habitable land; having probably remained in each of these states for considerable periods, as each of those alterations was produced by natural operations capable of being effected only in immense cycles of geological time. And while the remains and traces of marine animals embedded within ancient marine strata of the continents to which mankind have now succeeded, shew that all the superstrata of the countries which man inhabits, have been formed since the ocean was tenanted by the marine races thus entombed, the alternations of supervening and less ancient strata, which are themselves the monuments of incalculable time, clearly testify the subsequent repetition of great changes in those now tranquil areas of the globe. Thus the Tertiary formations owe their characters chiefly to repeated irruptions of the sea, and to repeated alternations of marine deposits with those of fresh water; and four distinct periods are marked in these formations, each indicative of a long extended duration in point of time: while the Secondary and Transition formations exhibit distinct sandstone formations mixed with rolled pebbles derived from earlier rocks, and alternating with deposits of limestone, clay and marl, as well as with materials derived from the detritus of the earlier rocks. These systems therefore indicate sub-marine formation, and the subsequent existence in the condition of dry land,

of strata which are now far beneath the surface, but which once afforded a residence to myriads of land animals as well as sustained those immense and luxuriant forests of now tropical vegetation, which, transmuted to the mineral state, are treasured up in the great coal formations. It will thus be seen, that the evidences of change are presented throughout the Tertiary, the Secondary, and the Transition series. The latter system of rocks (which derived that appellation from being considered to represent the passage of the earth from a chaotic to a habitable state,) is characterized by slates, and shelly strata, alternating with slaty-sandstone, limestone, conglomerate, and other rocks, and exhibits the occurrence of events at distant intervals, and the long prevalence of conditions anterior to the existence of animated life upon the globe.

The great convulsions of our Planet, the "bursting of its adamantine pavement," the dislocation of its strata, the upheaving of its molten masses, and the entombment of its living occupants, are further evidences to the occurrence of events which must have long preceded the existence of that system of things on the establishment of which, mankind, in fulfilment of a course of wise and benevolent adaptation, succeeded to the peaceful possession of the globe. We thus are led to view the existing world as "composed of the materials —not of the system of nature which was the immediate predecessor of the present; but,—of the system which in ascending from the present we consider as the third, and which had

preceded the land that was above the surface of the sea, while our present continents were yet beneath its waters." "There are," (it has been observed) "three distinct, successive periods of existence marked, and each of these is in our measurement of time, a cycle of indefinite duration."

The evidences drawn from the relative positions of the strata, are yet more striking than those deduced from their particular composition. These, with the evidences of gradual upheaving, the proofs of rending, fracture, and alteration, by volcanic agencies, which vast systems of sedimentary deposits present, are further testimonies of an extended duration.

After reviewing in his constantly perspicuous and argumentative style, the order of succession of stratified deposits and the evidences of gradual and slow accumulation which they display, Dr. Smith forcibly observes :—

"Let me intreat a thoughtful person to meditate on the succession thus reviewed. Let him represent to himself a series of earthy materials for the most part dried and consolidated into hard rock, proved by the plainest evidence of the senses to have been sediments from mixture in water, carrying in their texture and accompaniments the equally manifest proofs of quiet, gradual, and slow deposition; altered at different and long distant times, by forces urging from below, often and perhaps usually of very slow and gradual action, but frequently by the intrusion of melted rock driven up

with tremendous violence; and that the united thickness of the whole cannot be less than five miles, but certainly in extensive ranges, approaching to the double of that estimate. Let him ask, in each case, *whence* were those earthy materials derived. He will find that they have been worn away from the surfaces of antecedent, and now underlying rocks and dry land. Let him then reflect upon the time requisite for this repetition of objects so prodigious, producing a series of many terms, requiring intervals of both repose and action, to which it is difficult for the imagination to soar. And let him consider whether he can conceive the possibility of those results having been effected in less periods of duration, than such as bid defiance to our poor chronology." Supp. Notes to Relation of Scripture to Geol. p. 401.

The extreme slowness of the process of elevation of the land, furnishes an additional evidence to the antiquity of the earth. On this subject, the Rev. Dr. Smith observes, that " It is established by such evidence as places the fact beyond contradiction, that by far the larger part, more probably the whole, of the dry land, not excepting the highest mountains, has been raised out of the bed of the sea. There is also evidence that the process of elevation is extremely slow. The general proof accrues from the ancient beaches, now far above the highest sea-level, which abound on almost all bold coasts. But a favourable concurrence of cir-

cumstances has brought the elevation of an extensive portion of the Scandinavian peninsula within the range of measurement; and three feet in a century have been well established. Now there are successions of such ancient sea-beaches, in several of the glens of Scotland, at heights of eight, ten, twelve hundred feet, and more, above the present sea-level. Mr. Darwin has shewn, by a series of very probable arguments, that these have been all produced by the regular action of the ocean-waters upon rocky shores, and the no less regular rising of the land in its bodily mass, over large areas, and with that extreme slowness of which we have so many proofs. Applying then, the example of Sweden to the case before us, we bring out a period of 30,000 years, from the lowest, and of course, latest elevation, to the formation of the present shore: *and from the time of the highest elevation; the period is more than eighty thousand years.* But a period remains to be added to this, for the interval before that highest beach was raised, and while the upper part of the mountains was slowly rising out of the waters: for this prior period, no rule or approximation of estimate is known." Dr. Smith, Notes, pp. 401—406.

It is observed by the Rev. Professor Sedgwick, that "as different regions have been elevated at different periods, it seems probable that there must have been many periods for the formation of gravel, some at least long anterior to that last act of cre-

ation by which,—a fit habitation being at length prepared for him—man, and a new creation of beings, were called into existence by that Hand which had ordained and regulated all the previous movements."

The evidences drawn from Palæontology—the phenomena of organic remains—are now to be considered. These are deduced from the characters and succession, with regard to classes, genera, and species of the organic Fossils of the varied strata; they prove great changes of terrestrial condition, as well as successive and distinct creations, and their phenomena demonstrate beyond doubt, the very high antiquity of the earth.

The fact is now established, that "at successive periods of the past, the same area of land and water has been inhabited by species of animals and plants, as distinct as those which now people the antipodes, or which now co-exist in the arctic, temperate, and tropical zones." And it appears, (to quote Mr. Lyell,) "that from the remotest periods, there has ever been *a coming in of new organic forms, and an extinction of those which pre-existed* on the earth; some species having endured for a longer, others for a shorter time, *but none having ever reappeared after once dying out.* The law which has governed the creation and extinction of species, seems to be expressed in the verse of the poet—'Nature made it and then broke the die.'" Lyell's Elements of Geology, p. 275.

The facts that "a large proportion of the remains of animals and vegetables, differing more and more widely from existing species, as the strata in which we find them are placed at greater depths, belong to extinct genera, and almost all of them to extinct species, that lived and multiplied and died on or near the spots where they are now found, shews that the strata in which they occur were deposited slowly and gradually, during long periods of time, *and at widely distant intervals.* These extinct animals and vegetables could therefore have formed no part of the creation, with which we are immediately connected." Rev. Prof. Buckland, B. T. p. 17.

Each great period of change during which the surface of our planet was essentially modified, was also marked by the successive production and obliteration of certain races of animated beings. We thus find "distinct races successively arising, flourishing, decaying, and at length altogether disappearing; each species seeming to have, like the individuals of which it consists, a natural term of existence." Distinct periods were characterized by their own peculiar organic forms; and several classes or families, after possessing the globe for incalculable periods of time, passed away from its surface, and were succeeded by others of a different character. The various classes of organic beings, therefore, that have successively inhabited the earth, were not cotemporary on its surface.

The facts in regard to the distribution of organic

fossils, are exceedingly curious and instructive. We find that the genus Producta appears to have been among the first created;—of this family about fifty species are ascertained, and they extend through the Cumbrian, the Cambrian, the Silurian, the Old Red Sandstone systems, the Carboniferous Limestones, Shales, and Sands. The genus Spirifera, which seems to have been about cotemporary in origin, continues still higher, being found in the Lias. The Terebratula have a yet wider range, for this genus appears in the early stratified rocks, and continues till we reach the Chalk, in which it is more abundant than any other organic fossil: while species of this enduring class are found in the Tertiary formations, and are even represented in existing creation. The Ammonites, of which a thousand species are known, have not so wide a range. They first appear in the Silurian system, and continue to the Chalk inclusive, in which they wholly cease: and some genera and species begin and end with certain strata. It is thus evident that each species had a definite period of existence; and it is remarkable that not any species found in the chalk or earlier strata, are continued in existing creation. Some fossil genera are, however, still represented.

The remains of organic forms are found in all the stratified deposits, until we arrive at those containing the first instances of stratification, viz. the lower part of the Cambrian beds, and the gneiss and mica schist formations; and in these monuments of the

ancient conditions of land and water, Geology not only fails to discover any vestiges of organic life, but refers us to a state of things which must have been incompatible with the existence of animal or vegetable life; and thus, on the evidence of natural phenomena, establishes the important fact, that we find a starting point, on this side of which all forms, whether of animal or vegetable Life, must have had a beginning upon the globe. "We cannot doubt," says Lord Brougham, "that there was a time before the cooling of the terrestrial surface, when it was wholly unfitted for animal and vegetable life; and this necessarily lets in the posterior and successive creations of vegetables and animals." The conclusion thus expressed by his lordship, is unquestionably established in Geology, and no fact is more satisfactorily ascertained, than that a widely distant interval separated the original creation of the globe, from that of the first forms of life that tenanted its waters, or its surface; and that the successive creations of the several classes of organic beings by which it has been inhabited, *so far from having been cotemporaneous, were separated by immense intervals of time.*

The earliest appearance of the remains of former organic life, is in the slate rocks which occur in Cornwall, and form the mountains of North Wales—and these remains are shells only, unaccompanied by other organic forms. It is true that the vestiges of other forms of life, if any then existed on the

globe, may have been obliterated by the internal heat to which those rocks have been subjected; and we therefore cannot safely conclude that the organic forms whose remains occur in these slate mountains, absolutely were the earliest inhabitants of the globe, but it is highly probable that they were so. They occur in vast number, and the whole species, as well as the individuals of the species, appear to have begun and ended their existence in this one great formation. It is known that the duration of the life of the recent testacean races generally, extends to several years, and the duration of the species may be safely taken at a thousand times the life of the individual, which would give a period of six thousand years for the existence of any of the species of testacean animals.*

We find evidence of more than one change in the form, and cessation in the species of the organic tribes which characterize the slate system, in the thickness of only a few hundred feet of this early formation; and by applying the principle above given in reference to the duration of testacean species, we cannot resist the evidences of vast duration which are furnished in even one of the several homogeneous formations, which constitute this very early system of rocks—a system which, as we have seen, possesses an immense vertical extent.

From the slate rocks we come to the Silurian

* This convincing method of illustration is adopted by the Rev. Dr. Smith.

formations, which, as I have already mentioned, present a long succession of strata, extending to the thickness of many thousand feet. The Silurian fossils are distinct and characteristic; and it is a remarkable fact, that in this system we find the remains of nearly four hundred species of animals peculiar to it, and comprising the bones of Cetacea, the shells of various Crustacean tribes, Corallines, Encrinites, &c. &c.

Ascending to the Old Red Sandstone, or rather to the Devonian system of rocks, we find the remains of species, and even of *genera* of Fishes, which no longer exist, and not one of which can be identified in the orders of existing creation.

Next in the sequence of strata, at least in many localities, comes the Mountain Limestone—a formation often eight hundred feet in thickness, absolutely constituted of coralline and testacean remains, forming masses of stone hundreds of feet in vertical thickness, and often possessing a continuous horizontal range of some miles. All these vast formations, composed of unspeakable myriads of organic forms, unquestionably exhibit slow and gradual accumulation.

On these, supervene and alternate the Coal strata, with their accompanying formations; of these the shelly beds stretch many miles. This great system of strata being derived from the spoils of the luxuriant vegetation which clothed the ancient surface of the globe, presents, as I have already mentioned,

conclusive proofs of the lapse of incalculable ages. It is to be borne in mind that these formations contain not only the remains of land vegetables, but of fresh water shells and fishes. The alternation of limestone with inclosed fossils in the Coal strata, affords additional proof of the long periods occupied in these formations.

The extent of the shelly deposits associated with the coal formations, is sufficient to establish that long periods must have been occupied in their production—for a few inches of such formations require a period equal to the life of several generations of the animals whose remains thus occur. And the immense accumulations of fossil plants, of great size and peculiar character, in the coal series, all of which belong to extinct species, unequivocally testify the occurrence of terrestrial conditions unlike the present, and their long continuance in point of time.

We next come to the New Red Sandstone series, a formation much later than the Old Red Sandstone, and of immense extent. These distant systems are often separated by the intervening masses of mountain limestone; and the new red sandstone, which presents an average thickness of two thousand feet, in marls, clays, sands, conglomerates, magnesian limestone, &c., though containing in proportion fewer organic remains than the earlier formations above described, encloses, like the old red sandstone, the remains of fishes which are not continued in existing creation.

In this series of formations, however, a new and different order of things in regard to organic life began to exist. An animal of the lizard form, being the first appearance of reptile life, belongs to one of the formations of this remarkable system; while members of the same family, increased in number and species, and differing in character, and also possessing great size and formidable structure, characterize the Lias, the superior beds of the new red sandstone formation.

Professor Sedgwick remarks, that in passing through the new red sandstone series to the oolitic beds, we find again a complete change in all the forms of organic life, and that here also are presented the same evidences of the lapse of uncounted ages, that occur to us in passing from the Silurian to the Carboniferous epoch, or in the formations between the Tertiary series and the Chalk.

Arrived at the Oolitic series, we find the remains of animals of genera and species differing widely from preceding kinds, but still* unaccompanied by the remains of mammiferous animals; and we pass on through the great Chalk formation, and the inferior sands and clays, and through the remains of thousands of animals all specifically differing from those which fill the ranks of existing creation, before any traces of mammiferous animals occur. And even above the chalk, many deposits, recording

* With the solitary exception of the small marsupial animal found in the Oolite formation near Stonesfield.

long periods, supervene, before any such traces occur; and their earliest types even then differ from existing genera as well as species.

Of fossil fishes the genera of the Cretaceous formations are the first that approach to existing genera; but it is in the most recent Tertiary formations that fossil fishes first approximate to existing species. The proportion of existing species among these fossil remains, increases up to a point at which the older species that have met us throughout so great a vertical extent of older formations, themselves disappear, they having successively become extinct. And yet all these vast changes occurred before the warm blooded animals began to share the land, the forests, and the shores of the terrestrial surface. And it is not until we arrive at comparatively recent formations, subsequent even to deposits of the latest Tertiary epoch, that Mammalia of existing species are found in the fossil state, and even at that point the remains present specific differences from the analogues of the existing kingdoms.

While *seven thousand recent species of shells* are enumerated and defined, none of which are found in any but the comparatively recent formations of the earth's crust, it is a striking fact that *four thousand fossil species* of shells exist in the older strata of the globe, which are not continued in existing creation. And for the duration of many of these fossil species, (and they certainly were not all cotemporary) we must assign for each a period of some thousand years.

The vast accumulations of organic life, constituting the very substance of extensive formations, as for instance, the polishing stone of Tripoli; the laminar structure of some lacustrine formations, containing myriads of remains gradually accumulated through successive ages; and various phenomena of a similar character, also concur in establishing the vast periods of time represented by the organic contents of the strata of the globe.

"Every thing," says the Rev. Professor Sedgwick, "indicates a very long and very slow progression; —one creation flourishing and performing its part, and gradually dying off as it has so performed its part, and another actual creation of new beings, not derived as progeny from the former, gradually taking its place, and again this new creation succeeded by a third. Nothing *per saltum*—all according to law and order, all bearing the impress of mind, of a great dominant will, at the bidding of which all parts of nature have their peculiar movements, their periods of revolution, their rise and fall."

From all these facts, it clearly appears that there were periods, when by far the greater proportion of life was marine—others, in which reptiles of gigantic and extinct structure predominated—these periods being characterized by the absence of terrestrial quadrupeds, or at all events, of those of the larger kinds. Thus, in the Transition series, we find the remarkable family of Trilobites, belonging to the class Articulated animals; several families of Mol-

lusca, (of which many are extinct); some animals of the class Radiata; and a few fishes; with some fossil vegetables, which in the lower beds are few, and principally marine, and in the upper beds are the remains of the earliest land plants that clothed the ancient surface; but we do not find till we come to the groups of the Secondary formations, the remains of quadrupeds, even of reptiles, and then we do not find the remains of warm-blooded terrestrial Mammalia. This extensive series exclusively comprehends those gigantic reptiles of the Saurian class, both marine, amphibious, and terrestrial, which excite so much interest and wonder, and it may be said to form their "family tomb," for they seem confined to its formations. In the Tertiary series even, through four extensive groups of stratified deposits, the mammalian remains are of extinct species. And the absence of any fossil remains of the human race, even in these comparatively recent formations, seems to shew that Man had not then become an inhabitant of the globe. It is pretty clear that he was not cotemporary with the Mastodonta, the Megatheria, and the similar extinct animals that once ranged its surface. In the superficial gravels, with rolled blocks derived from distant mountains, the bones of rhinoceros, of elephant, &c. of extinct species are found, but still no fragment of a human bone, or any trace of Man. The absence or the presence of mammalian remains has separated these

formations into two leading divisions, one of which comprehends four groups, which, in descending order, are, Gravel containing bones of land animals; superficial Clay and sand containing those bones, with marine shells of existing species; fluviatile and lacustrine deposits, containing mammalian remains in great abundance, with land and fresh-water Shells, a small proportion of which are extinct; and, Mammiferous crag (of Norfolk) containing the bones of Mammalia, and of Birds and Fishes, and about eighty species of Shells both of land and fresh-water, as well as marine, species: and the other of which comprehends four groups, all distinguished by the absence of terrestrial Mammalia, which groups are, Red Crag, (of Suffolk) containing the bones of fishes, with from 150 to 200 species of shells; Coralline Crag, (of Suffolk) containing from 300 to 400 species of shells; London clay, the formation occurring at Hampstead, Sheppey, &c.; and Plastic clay. The result of an inquiry into the per-centage of recent species in several of these groups is very curious; thus, in the superficial clay and sand, and the fluviatile and lacustrine deposits taken together, 90 per cent. are of recent species; in the Mammiferous crag between 50 and 60 per cent are recent; in the Red crag 30 per cent. are recent; and in the Coralline crag 20 per cent. are recent. The four distinct periods in the order of succession of these formations, are marked by the different proportions between recent and extinct species of Shells. Of the

7000 species of recent Shells which are known and enumerated, not one exists in the fossil state in the earth's crust, excepting in the most recent formations above the chalk. And the proportions to existing species, of those which do exist in these recent formations, are, according to Mr. Lyell's nomenclature, as follows, viz. in the Eocene period (representing the dawn of the existing orders) 3½ per cent. only are recent; in the Miocene 18 per cent. are recent; in the older Pliocene from 35 to 50 per cent. are recent; and in the newer Pliocene from 90 to 95, the older species having at this point become almost extinct.*

That certain inferior Tertiary strata, and the upper beds of the same series were not simultaneously formed, but were separated by an immense lapse of time, is indicated by their respective remains, for we find that the old species which exist in myriads of individuals above the chalk, disappear and are replaced by different species in the chalk below. And the entire change of types which is marked by the Cretaceous formations, supplies additional proof of lapse of time; while the occasional occurrence of beds of shingle, and fossils of the

* This fourfold division of the marine deposits of the Tertiary series was proposed by Mr. Lyell and M. Deshayes, the former of whom applied to the divisions these names compounded from the Greek; the term Eocene implying the dawn of the existing state; the term Miocene that a minority of the fossil shells of that period are of recent species; and the term Pliocene, that a majority belong to existing species, they being more abundant in the Newer than in the Older Pliocene formations.

chalk, between the Chalk and the lowest tertiary deposits, also establishes the occurrence of intermediate conditions, and the lapse of further periods of time.

As regards orders and genera of organic beings equally striking proportions exist. Thus, with regard to Fishes, the genera of the Cretaceous formations are the first that approximate to existing kinds. And even in the inferior beds of the chalk but one living genus is found, and in the true chalk but five. Of the four orders of Fishes, two only existed before the commencement of the chalk formations, and the two other orders, to which three-fourths of the 8000 living species belong, appear in the chalk formations for the first time, when all the fossil genera of the two first orders had become extinct. The numerical proportions between the fossil and the existing members of the animal and vegetable kingdoms are well deserving our attentive investigation, for they announce very important and interesting facts. Such comparison however is too extensive for its results to be adequately stated here; but in addition to those already mentioned, the following may be referred to, as likewise proving that all organic forms were not simultaneously created, but were related to the varying conditions of the globe.*

* It appears, for instance, (to quote the language of Dr. Buckland) that "all the great changes in the character of fossil Fishes took place simultaneously with the most important alterations in the other classes of fossil Animals, and in fossil Vegetables; and also in the mineral condition of the strata."

That while the proportion of terrestrial animals and plants is as two hundred and ten recent species to one fossil, that of fresh-water races is but as twelve to one, and of marine kinds only twenty-one recent to ten fossil kinds; the proportion of recent life to that of the former globe, deduced from all the members of animated nature collectively, being twenty-six to one. That the period of the dawn of the existing system of animal and vegetable life was accompanied by the greatest number of fossil shells, and that the proportion amongst them of existing species, is in that period the least, while the smaller number of fossil shells characterize the period the majority of the remains in which are of recent kinds. That although there is an overwhelming preponderance of existing races, the fossil species of particular marine tribes actually outnumbered the living ranks of creation. That several other orders among former systems of organic life existed in relative proportions dissimilar to those in existing nature. That a gradual decrease is perceptible as we approach the earlier systems of rocks, till we at length lose all traces of animated existence; thus, in a hundred feet depth of the Tertiary deposits, one hundred and forty-six species of animal structures are enumerated, in the like extent of the Chalk deposits, seventy, in the Oolitic (the series in which the Ammonites, and other remarkable chambered shells occur,) forty-five species; of the Saliferous deposits only eight species, of the

Carboniferous (or coal formations) four species, while in the same extent of the rocks which were called "Primary" only two species are known. A hundred times as many plants are known on the existing surface of the globe, as in the fossil state, while the Zoophyta are nearly equal: of the class Mollusca, six thousand recent species exist, and four thousand eight hundred are known in the fossil state; and about two hundred and eighty times as many living species of the class Articulated Animals exist as are found in the stratified formations, ten times as many species of Fishes, thirty-five times as many species of Reptiles, five hundred times as many species of Birds, and twenty times as many species of mammiferous quadrupeds.

The foregoing facts then clearly prove:—

First, From the mineralogical characters of the various stratified and unstratified formations that compose the crust of the globe—That our planet was not originally created in the mineralogical condition in which we find it, nor at a period so recent as that assigned by the received chronology of the Mosaic text, and that it must have had existence for countless ages, in order to arrive at that condition.

Secondly, From the order of superposition and occurrence of the rocks, as evidencing revolutions upon its surface — That our planet has passed through great changes, and through conditions wholly unlike the present, in arriving at its existing state. And

Thirdly, From the characters of the organic remains imbedded in its strata—That our globe must have remained for myriads of ages, in a condition unfitted to the support, or even existence, of organic life of any kind; that we can clearly perceive the starting point at which animated existence began upon its ancient surface; that the system of life then called into being was succeeded by several other systems of animal and vegetable life, and this in due course of adaptation to the particular conditions of the globe, respecting each of which systems it is equally proved, that *there was a time when their existence had not commenced;* that existing orders, genera, and species, have had a beginning, and this at a period comparatively recent in the physical history of our globe; that the various classes of organic beings, therefore, by which the earth has been inhabited, were not cotemporary on its surface, but that particular genera and species, after possessing the globe for incalculable periods of time, passed away from its surface, to be succeeded by others of a different character; and that the great changes in organic life (attested by the examination of fossil remains, and their comparison with existing kinds) furnish sufficient evidence of corresponding changes in the earlier conditions of our planet.

It is most clear that the phenomena here described cannot have been produced in less than myriads of such cycles of time as constitute the whole period

that has elapsed since the creation of the human race. And it is thus unquestionably established, that "the whole duration of human society, lengthened as it appears to us, is scarcely an unit in that extended chronology, which acknowledges no 'beginning,' save that in which 'GOD created the heavens and the earth.'"

These, then, are the concurrent evidences which render it impossible to escape the conviction of the immense antiquity of the earth, and of the whole system of created beings. And the mass of evidence which thus combines to prove the great antiquity of the earth, is (to borrow the language of an eminent philosopher,) so irresistible, and so unshaken by any opposing facts, that none but those who are alike incapable of observing the facts, and appreciating the reasoning, can for a moment conceive the present state of its surface to have been the result of only 6000 years of existence. Those observers and philosophers who have spent their lives in the study of Geology, have arrived at the conclusion that there exists irresistible evidence, that the date of the earth's first formation is far anterior to the epoch *supposed to be* assigned to it by Moses: and it is now admitted by all competent observers that the formations, even those strata which are *nearest the surface*, must have occupied vast periods, probably millions of years, in arriving at their present state. Mr. Babbage, Ninth Bridg. Treat. 67, 68.

Chapter IV.

General Considerations on the bearing of certain Conclusions in Geology, upon the Doctrine which the Mosaic Text has been commonly represented to teach, in regard to the Ancient History and Duration of the Globe.

" Prius autem intellige, et deinde ad opus accede."

From the consideration of the important results to which the cultivation of geological researches have led, and of the apparently startling proofs of the antiquity of the earth which form the subject of the preceding chapter, we now come to the consideration of the results which have attended the establishment, by Geologists, of truths so much at variance with the opinions generally founded, and cherished with all the jealousy of religious faith, upon the Mosaic narrative of the Creation.

Geology has indeed in its progress most singularly modified the views of the ancient history of the world, which were universally received until the lights of modern science became diffused. Natural history in our earlier days " extended no further," says an eminent writer, " than the class of creations which the earth's existing surface presented to our view ;"—and " no well ascertained

facts or striking deductions" he continues, " ran counter to the pious conviction that the earth and all that was therein, were created in the short period of six days." In that "dark age" of Geology " her science" continues the same author, " rested on the two assumptions that the world was made in six days, and that it was afterwards overwhelmed in the waters of an universal deluge; and hence arose a series of erroneous positions, impregnable to human reason, because guarded with all the sanctities of religious belief." . . . " The primitive waters of the globe were held to be an universal menstruum, capable of dissolving the most refractory substances, and the primitive mountains themselves, the metallic ores, the hardest gems, and even the adamant itself, were supposed to be chemical precipitates from this chaotic fluid." Geologists however, were soon led to very different conclusions; they discovered proofs within the globe itself, that the external parts of the earth were " not all produced in the beginning of things in the state in which we now behold them, nor in an instant of time." On the contrary, the investigations of Geology could not fail to establish that " these parts of the globe acquired their actual configuration and condition gradually, under a great variety of circumstances, and at successive periods, during each of which, distinct races of living beings have flourished on the land and in the waters, the remains of these creatures still lying buried in

the crust of the earth." Lyell, Elements of Geology, p. 2.

Inquiries touching a system of nature "calculated for millions, not of years only, nor of the ages of man, but of the races of men, and the succession of empires," would seem to be of all inquiries the most exempt from considerations connected with the "memory of man, or any human record which continues the memory of man from age to age." It would seem clear that the geological occurrences of times passed away long before his creation, must be read only in the present state of the globe, and be capable of elucidation only by the clear testimonies of the fossil remains of the animals and plants which actually inhabited its surface, in the periods to which our inquiries relate; and equally clear that "the laws of nature established in the science of man by his inductive reasonings," are the only means by which such testimonies can be read. And as a series of stratified deposits "represents volumes of history in which each writer has recorded the annals of his own times, and then laid down the book with the last written page uppermost, upon the volume in which the events of the era immediately preceding were communicated,"*— it seems equally plain that such deposits with their organic contents, must furnish a sufficient, a faithful, and a decisive authority with regard to the times and the events thus inscribed upon them. But

* Lyell, Elem. Geol. p. 212.

presumptuous ignorance and prejudice have intruded the sanctities of Scripture on these considerations, and require that their own interpretation of the Mosaic history of the Creation and the Deluge, shall be the standard by which the subterranean record shall be read. They forget that the doctrines or assumptions in which their prejudices are involved, are of no authority in matters of science, and that any doctrines which stand opposed to the revelation inscribed upon the globe, must be unworthy of belief, and must be the creation of human error, since that revelation could not be at variance with a revelation delivered in Scripture. "A geological truth," it has been observed, "must command our assent as powerfully as that of the existence of our own minds, or of the Deity Himself, and any alleged revelation which stands opposed to such truth, must be false. The geologist has, therefore, nothing to do with revealed religion in his scientific inquiries. It is the office of the divine to interpret the sacred canon, and if he does it with the discrimination and learning it demands, he will never find it at variance with the deductions of science. If Scripture, on the contrary, is studied by instalments and viewed from insulated points, and interpreted literally in its detached passages, we shall find it at variance with itself, and shall reproduce all the heresies that have disgraced the history of the Christian church. But if we look at the sacred scheme as a whole, and

generalize its individual propositions, we shall find in it a unity of doctrine and a law of faith, as unerring as any of those which preside over the material world." So distinct and independent indeed, are the declarations of science and the authority of Scripture, that it is astonishing they should ever be brought in conflict, or thought capable of exerting any hostile influence upon each other.

But a *particular doctrine* as to the events which anciently affected the globe, having been framed on the introductory portion of the Book of Genesis—a construction having, in the absence of better means of information, been placed on the Word of God, which a better acquaintance with the testimony of His works, and the exercise of a cautious reflection, has shewn to be unjustifiable and incorrect, but which has been implicitly received and adopted as the rule of belief on the history of the globe, and most unnecessarily invested with the character of an Article of religious faith, and with the sanctities of religious doctrine, it was held from one generation to another, and it was a faith impressed in childhood and retained in age, that at a period not more than about six thousand years distant, not only the existing system of nature, but our globe itself, was created in six days, and that after a duration of about one thousand six hundred years, during which the account in question does not state any change to have occurred, the wickedness of mankind provoked the wrath of

the Almighty, who brought a flood upon the whole earth, which covered the highest mountains, and for one hundred and fifty days prevailed upon the land, utterly destroying all living forms except those few saved by His special providence in an ark, from whom the present inhabitants of the earth are descended: and further, that this supernatural deluge was the only event of the kind that ever affected our planet.

To such views as these the startling discoveries of Geology were necessarily opposed; the doctrine of central heat is obviously inconsistent with the history given in the book of Genesis; and the doctrines of the Huttonian science were not calculated to escape the open hostility of persons whose preconceived and cherished opinion those doctrines so formidably impeached, for they were necessarily arrayed against that "spurious chronology of the deluge and of the six days of creation," which was then so jealously cherished, and so industriously taught. A battle was long contested between "the literal interpreters of Scripture, and those gifted men, who recognised the handwriting of the Creator in *His works as well as in His word.*" The contest was characterized on the one side by the patient, the enlightened, and justly confident, spirit of philosophic inquiry, supported in the calm and fearless dignity of scientific truth, and anxious to maintain truth alone and to defend the validity of its acquisitions; but on the other, by a fanaticism as frenzied

as that which had sought to crush the discoveries of the immortal Galileo,—by the employment against geologists of charges of "infidelity and atheism," and by the grossest party feeling, and disregard of all temperate and candid argument. Prejudices being thus arrayed against the most demonstrable truths in natural science, every disclosure from the subterranean record, was regarded as an additional expedient of geologists to subvert the authority of Scripture; and, absurd as it appears, the philosopher could not write a book on the subject of heat, without subjecting himself to the charge of "attacking the grand principle of natural religion," and the truths of revelation. But the field was ultimately in effect relinquished by the literal interpreters of Scripture, to their scientific opponents; and the enemies of eternal and immutable truths have gradually vanished before the advancing splendour of the discoveries to which the illustrious Hutton and Cuvier led the way.

Although the lamentable, the humiliating contest between the demonstrations of science and the errors of prejudice, which occurred on the developement of the great truths of the Huttonian philosophy, has thus been decided in the triumph of geological science, and although the too literal interpreters of the Mosaic text, "the self-styled guardians of the Christian faith," who needlessly opposed their prejudiced hostility to the progress of scientific research, have long abandoned the field, or have at all events

virtually relinquished it to the resistless power of scientific truth,—the "evil spirit of prejudice" is unfortunately, perpetuated in some of their successors; and the pretenders to "exclusive piety" still think proper to manifest their regard for Scripture—a regard of which they claim the exclusive possession—by representing that the conclusions of geology should be viewed with apprehension and distrust. These are efforts to arrest the tide of scientific discovery, to oppose the exercise of human reason in the most legitimate department of its application, and to resist the unavoidable testimony of natural monuments themselves; and the modern objectors to Geology (who as inappropriately as pharisaically, arrogate to themselves exclusively the character of "friends of Scripture,") are so much attached to the hitherto received interpretation of the Mosaic text in regard to the Creation and the Flood, that they prefer that the sacred narrative should, by retaining that interpretation, *be made to appear at variance* with the paramount evidences contributed by the researches of Geology, than that the doctrine which was adopted in the absence of better means of information, and which they have been accustomed to think and *to represent the Mosaic narrative as teaching*, should be abandoned for one, which to an unprejudiced mind, could possess no higher claim to reception than the fact of its being contributed by those unquestionable evidences of the truth.

It is not surprising that the interests of religion itself should suffer, by the mode which is adopted to sustain a favorite interpretation of Scripture against the evidences of nature, and to fortify by the specious and illusive plea that religion is staked on the preservation of that doctrine, an interpretation which its supporters know to be unjustifiable from the beginning, which they also know to be decisively and unavoidably contradicted by the unsophisticated and infallible testimonies of the globe, but which nevertheless they are unwilling to surrender.

A knowledge of the reconciliation which the anxious, the sincere, and unremitting labours of Christian philosophers have succeeded in establishing between the unquestionable testimonies of science and the declarations of Scripture—authorities which, if rightly interpreted, could never have appeared at variance, is the more important, inasmuch as the misrepresentations which have been made in order to disparage the researches of Geology, and sustain the unjustifiable interpretation hitherto received, have not only produced erroneous impressions where the authority of Geological truths has not been duly weighed, but have been construed by the thoughtless and the wavering, in a manner very unfavorable to the sacred interests of Scripture, and consequently, of mankind; whereas upon a right and unprejudiced view of the subject, it will be found that the researches of Geology are inseparably connected with the interests of religion,

and that those researches do not in reality, furnish any ground for apprehension to the most zealous friend of revelation. The unwarrantable policy of the line of argument adopted to support "pre-conceived opinions" in opposition to the evidences of science, being to impugn as "inimical to religion," all conclusions, however well established, which contradict a favorite interpretation of obscure passages in Scripture, and to denounce as the disciples of infidelity, the eminently Christian and philosophic minds that have yielded to the infallible and convincing testimonies presented to them in Geological research; the result of that policy has been to mislead persons who have not been able to cultivate the researches of Geological science, and are unprovided with the materials for impartial judgment. It becomes therefore most important that they should be led to appreciate the tendency of those researches, and should be provided with the materials for that judgment.

The persons who are unwilling to estimate the value of discoveries and conclusions in science, by any other standard than that of discordance or harmony with their own pre-conceived notions, would in fact make "all nature bend to their own narrow interpretations of obscure and difficult passages in the sacred writings," though they ought on the contrary to feel that "they are equally incompetent to fathom the depths of science, or to clear up the obscurities of Scripture." And while they

"denounce as heterodox the current opinions of geologists with respect to the high antiquity of the earth, and of certain classes of organic beings, they do not scruple to promulgate theories concerning the Creation and the Deluge, derived from their own expositions of the sacred text, in which they endeavour to point out the accordance of the Mosaic history with phenomena which they have never studied, and to judge of which, every page of their writings proves their consummate incompetence." (Mr Lyell, in Quarterly Rev. for 1827, Vol. 14.) In their presuming ignorance, some writers venture to call upon geologists to abandon the mass of useful and valuable facts, of instructive and elevated inductions, which they have with patient research accumulated in this science. They deny to geologists the privilege of interpreting the facts which their researches have brought to light. They represent geologists as being incapable to deduce legitimate inferences from the observations of science; and they in fact call on geologists to leave the interpretation of the monuments of the globe, to persons who do not possess any shadow of a claim to become the censors of scientific conclusions, or to dictate to those acquainted with the facts of science. The anti-geologists would fetter within the narrow and artificial limits of *the chronology untruly alleged to be taught by the Scriptures*, a range of inquiry, which is one of the most splendid and valuable that science or religion can boast, and

would command the philosopher that he venture to ascribe to the peaceful deluge narrated in the Mosaic history, and to that event alone, the convulsions, the dislocations, and other characteristic phenomena which so unequivocally attest the successive changes and immense antiquity of the globe.

To the Rev. Professor Sedgwick, whose learning, whose scientific attainments, correct observation, accomplished mind, and Christian piety, render him an ornament of the University of Cambridge, I am indebted for the following remarks:—

"A philosopher may smile at the fulminations of the Vatican against those who, with Copernicus, maintained the motion of the earth; but he ought to sigh, when he finds that the heart of man is no better than it was of old, and that his arrogance and folly are still the same. There are still found some who dare to affirm that the pursuits of natural science are hostile to religion. An assertion more false in itself, or more dishonourable to the cause of true religion, has not been conceived in the mind of man.

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"If the astronomer tells us of myriads of worlds not spoken of in the sacred records; the geologist in like manner proves (not by arguments from analogy, but by the incontrovertible evidence of physical phenomena) that there were former conditions of our planet, separated from each other by vast intervals of time, during which man, and the

other creatures of his own date, had not been called into being. Periods such as these, belong not, therefore, to the moral history of our race; and come within neither the letter or the spirit of revelation. Between the first creation of the earth, and that day in which it pleased God to place man upon it, who shall dare to define the interval? On this question Scripture is silent, but that silence destroys not the meaning of those physical monuments of His power, which God has put before our eyes, giving us at the same time faculties whereby we may interpret them and comprehend their meaning.

"In the present condition of our knowledge, a statement like this is surely enough to satisfy the reasonable scruples of a religious mind. But let us, for a moment, suppose that there are some religious difficulties in the conclusions of Geology: how, then, are we to solve them? Not by shutting our eyes to facts, or denying the evidence of our senses; but by patient investigation carried on in the sincere love of truth, and by learning to reject every consequence not warranted by direct physical evidence. Pursued in this spirit, Geology can neither lead to any false conclusions, nor offend against any religious truth. And this is the spirit in which many men have of late years followed this delightful science; devoting the best labours of their lives to its cultivation, turning over the successive leaves of nature's book, and interpreting her language, which they know to be a physical

revelation of God's will; patiently working their way through investigations requiring much toil of both mind and body; accepting hypotheses only as a means of connecting disjointed phenomena, and rejecting them when they become unfitted for that office, so as, in the end to build only upon facts and true natural causes. All this they have done, and are still doing: so that, however unfinished may be the fabric they have attempted to rear, its foundations are laid upon a rock.

"But there is another class of men who pursue Geology by a nearer road, and are guided by a different light. Well-intentioned they may be: but they have betrayed no small self-sufficiency, along with a shameful want of knowledge of the fundamental facts they presume to write about. Hence, they have dishonoured the literature of this country, by 'Mosaic Geology,' 'Scripture Geology,' and other works of cosmogony with kindred titles; wherein they have overlooked the end and aim of revelation, tortured the Book of Life out of its proper meaning, and wantonly contrived to bring about a collision between natural phenomena and the Word of God. They have committed the folly and the sin, of dogmatizing on matters which they have not personally examined, and at the utmost, know only at second-hand; of pretending to teach mankind on points where they themselves are uninstructed. Authors such as these ought to have first considered, that book-learning, (in whatsoever

degree they may be gifted with it,) is but a pitiful excuse for writing mischievous nonsense; and that to a divine or a man of letters, ignorance of the laws of nature, is then, only, disgraceful when he quits his own ground and pretends to teach philosophy. *A Brahmin crushed with a stone, the miscroscope that first shewed him living things amongst the vegetables of his daily food.*

"It would indeed be a vain and idle task, to engage in controversy with this school of false philosophy, to waste our breath in the forms of exact reasoning unfitted to the comprehension of our antagonists; *to draw our weapons in a combat where victory could give no honour.* Their position is impregnable, while they remain within the fences of their ignorance."*

These writers, who pharisaically denominate themselves "the friends of Scripture" should, instead of endeavouring to invalidate, upon foreign grounds, the evidences of Geology, pause to reflect that the monuments of the globe must be the only competent historians of its own eventful periods; and that since the interpretation they were accustomed, in the absence of better means of information, to place upon the Mosaic history of the world is contradicted by the testimony of nature, and must clearly yield to the authoritative language of the globe, it cannot be the legitimate interpretation of

* Discourse on the Studies of the University, 1834. pp. 148 to 152.

the text; and should further reflect, that by adopting an altered interpretation, justified by considerations arising on the narrative itself, and in harmony with the text, that narrative may be rendered perfectly reconcilable with the unequivocal and authoritative revelation inscribed upon the globe. By so doing they would discover that by a concession, not of any portion of the inspired text, but of their own interpretation of it—a concession neither impeaching the veracity "of the text nor their own previous judgment," the declarations of Scripture may be reconciled with those of Geology, and the testimony of Scripture confirmed by this science, upon every point in which the sincerest Christian could require the confirmation; and in return for that concession, the "friends of Scripture" would be enabled to regard Geology in its true features, and as furnishing new evidences to the power, the wisdom, and the goodness of God, and to regard the sacred records as unimpeached, nay, as supported, by the discoveries of science.

So philosophical an examination of the subject, however, is unfortunately not congenial with the perverseness and fanaticism of those, who, for the gratification of their own conceits, desire to set reason and revelation at variance. They consequently persist in bringing the sacred Scriptures into conflict with Geology, and in endeavouring to renew the old and bygone controversy on the subject. And the conclusions of Geology have,

therefore, even lately, been represented as being "speculative," and "merely theoretical," where connected with science, and as "tending to infidelity" and "impiety," where affecting religion. And it has been further alleged, that Geologists cannot bring forward even *facts* inconsistent with the received interpretation before referred to, without compromising their respect for revelation. And the cultivation of Geology has been represented as being undertaken for the purpose of placing its conclusions in hostile conflict with the Scriptures, and for the mere sake of innovation upon received opinions! Geology has also been called on to "modify its conclusions," in order to *adapt them* to the Mosaic text; and geologists, in fact, have been required to re-model the phenomena of the globe "according to (Mosaic) law." Thus, in a recent edition of Goldsmith's Natural History, the editor indulges in the following remark:—

"M. Cuvier indeed, by his catastrophes and epochs, agrees with many scientific men in assigning a far higher antiquity to our globe than is consistent with the Mosaic account of the origin of things; but no Christian will hesitate *which to prefer;* and Granville Penn has abundantly *demonstrated,* what indeed there could be no good reason to doubt, that *the objections to the Christian revelation, founded on the facts of Geology,* are as unphilosophical as they are *impious!*"

Another author, (the Rev. Mr. Harcourt) appa-

rently overlooking the authority of facts, and of the revelation impressed on the unsophisticated monuments of the globe, has sought to cast doubts on the validity of the conclusions established in Geology, and endeavours, (as he says) "so to corroborate the Mosaic text" by traditional testimony, and mythological observance, "as to give it an authority too great," as he expresses it, "to be shaken by the difficulty of reconciling the text with the present appearance of the earth." The Rev. gentleman (one of the latest authors on this question) accordingly brings forward mythological rites and traditional observances, as militating against the conclusions which, *on irresistible evidence*, are established in Geology; and he has ransacked the mazes of pagan mythology for traditional memorials of the ark, seeking "to prove that the united testimony of all ancient nations" corroborates the received doctrine of the Mosaic Flood.

Other authors endeavour to extort from the phenomena of the globe a confirmation of the literal interpretation which they have placed on the Mosaic text; and among them, Mr. Fairholme has lately published an able work, in which, taking that text as a "sufficient and infallible guide," he endeavours to maintain the literal truth of the Noachian Deluge, both as to the fact and period of its occurrence, and that it was the only event of the kind. Certainly Mr. Fairholme, whose research must have been considerable, is entitled to the credit of recognizing a more philosophic principle

in the discussion, for he argues upon alleged phenomena of the globe, alone, and such is the only admissible source of argument on this subject. It will be foreign to the plan of the present Essay to enter upon an examination of Mr. Fairholme's arguments, as stated in his work, "The Geology of Scripture;" but I may here state the unavoidable conviction, to which a correct investigation of geological phenomena must lead, viz. that many of the conclusions drawn by Mr. Fairholme, have not a sufficient or valid foundation, and that they are disproved by many geological phenomena, which have not received their legitimate interpretation, or due share of weight, in the work to which I refer.

Other authors, finding that there are facts established in Geology, which are utterly incapable of furnishing the confirmation they desire, and which in truth declare the fallacy of the received interpretation placed upon a portion of the Mosaic text, adopt the less philosophical mode of seeking to invalidate the conclusions of "human science," and the application of what are somewhat vulgarly termed "natural-sense principles," generally, where productive of a result inconsistent with received opinions founded on Scriptural sources. Mr. Mellor Brown, a writer of this school, very characteristically remarks, "that an humble mind will be ready to confess that events which took place *before the birth of man, or the date of Revelation*, belong to a *forbidden* province!"

It has been truly observed, that it really is an insult to men's understandings, to admit that there are doctrines in the records of revealed religion which are disproved by the clearest evidences of science; and then to proscribe investigation, with a solemn pretence of mysteries not to be inquired into, an hypocritical tone of reverence for sacred things.

The Rev. Dr. Pye Smith gives the following appropriate character of the adverse writers on the subject — of whom he observes, "It may be said, that however dissimilar in some respects, they agree in certain characters; such as the laying down of facts or statements in a partial manner, thus producing defective, and often widely erroneous impressions; the keeping out of sight other facts which would be adverse to their hypotheses, probably from not being themselves acquainted with those facts; a frequent forgetfulness of equity in stating and describing the objects under consideration; their being either insensible to the difficulties which belong to their own schemes, or not feeling any obligation to remove those difficulties; *in short, their carrying on their arguments in the way which, in another department of human talent, bears the name of special pleading.*"

Now, to all but the simile adopted by the Rev. Dr. in the last part of the foregoing definition, I most cordially subscribe; and I repeat these observations of the learned author here, as they appear to me most accurately to describe the uncandid

and unphilosophical course adopted by the anti-geological writers. But, from the peculiar illustration with which the Rev. Doctor sums up the observations, I must be allowed, on behalf of the law, to dissent: and, for the honour of the profession, I must protest against the refined processes of legal science—the science which Blackstone justly characterized as "the height of human reason,"—being represented as furnishing the type by which emphatically to compare the qualities that so dishonourably characterize the writers adverse to geological science. I cannot allow the propriety of representing every species of falsehood, sophistry, want of candour, of judgment, of equity, and of just perception, by "special pleading;" nor can I admit that special pleading furnishes any point of analogy, or any features with which to compare the mode of false reasoning, adopted by those who presume to animadvert on the noble department of geological inquiry.

The Rev. Dr. Smith most justly convicts those prejudiced and mistaken writers, of the unpardonable presumption of dogmatizing on a subject which they do not understand, and of misrepresenting evidence, the tendency of which they are unable to appreciate and to perceive; and his position, and his character are such, that I am sure he can well afford to those admirers of the science of Geology, who also belong to the honourable profession of the law, the opportunity which, in the most perfect

good humour, I cannot refrain from giving to them, of reminding the learned and amiable author that the doctrine he has so justly enunciated, will apply in his own case, if he meddles with the principles of legal warfare, and indulges in hypothetical representations of special pleading, since *that* has not been "the department of human talent," to which his own mind has been directed. The Rev. Doctor is too highly endowed with Christian charity, possesses a faculty of judgment too accurate and refined, and is moreover too amiable and too accomplished, to be capable of intentionally reflecting on the professors of the law; and I am sure if the talents which he has so honourably and so successfully devoted to the best interests of his sacred profession, and consequently of society, had happened to have been directed to the principles of "special pleading," we should have had the advantage of his testimony to its highly honourable, its scientific, and useful character, and to the fact that the highest efforts of human reason, the practical application of the most recondite science, and principles of the highest morality and virtue, are exemplified in "the department of human talent" to which he thus refers.

With apologies for this digression, I must proceed to observe that, although the anti-geological writers profess a desire to sustain revelation, the expedients they adopt, not being sanctioned by reason or philosophy, are therefore not calculated to facilitate the

harmonious reconciliation so desirable upon this subject, and so capable of attainment by the adoption of a reasonable and philosophic course. Besides, the primeval history of the globe, during those long ages which elapsed before its occupation by man, is one which geological researches, and those researches only, can investigate: and, while the primary authority of the book of nature—a book whose annals those researches alone are privileged to read—can be consulted, any arguments founded on human tradition are wholly inadmissible. And therefore, had the Rev. Mr. Harcourt's efforts proved anything beyond the depth of his own learning, and the extent of his antiquarian research, of both of which his work, "The Doctrine of the Deluge," is an honourable memorial, they could not have availed against the express, the decisive, language of nature. The Rev. Mr. Harcourt's efforts, however, are in fact an endeavour to silence the eloquent and convincing logic by which the fossil world, as if re-animated, pleads to our conviction; by the cold, the glimmering, and deceitful lights of the mythologic page, or of traditional belief.

The attempt to countervail the authority of the established conclusions of Geology, by endeavouring to sustain against the actual language of nature, a particular interpretation of an obscure and doubtful portion of the Book of Genesis, must be regarded by the geologist as vain and futile, must be unsatisfactory to a sound and philosophic mind, and

must among many persons re-act most prejudicially on their estimation of the authority of Scripture itself, since it is thus made to appear as requiring such corroboration.

Such then is the question which still continues to be so unnecessarily agitated between Geology and Scripture. On the one hand is a science, that ranks among the noblest objects of attention—not only on account of its nature, its objects, and the province of its research, but also of the results to which it has led. A science which, "so far from sanctioning any conclusions, or establishing any facts inimical to the doctrines of religious faith," invariably and impressively confirms and extends the foundation of the truths of revealed religion. A science, the researches of which have added a new and splendid empire to Natural Theology, and a vast and well stored field to scientific inquiries in other branches of natural philosophy. And, above all, a science which has *completed, by the testimony of the fossil world, the demonstration of design in Creation, and of the presidence of Supreme Wisdom, Goodness, and Power.* On the other, is a favorite interpretation of doubtful passages in the Mosaic account of events which happened in countless ages before the creation of mankind, of "events which man could neither have witnessed or recorded,"—that account being one which is by very learned authority adjudged to be totally foreign to the object of the sacred writings; and that interpretation being one

which, taken literally, is directly contradicted by the elder and existing record of whose contents the Mosaic narrative gives secondary evidence, although while the original record, viz. the earth, can itself be consulted. And an interpretation associated, it is true, with the religious belief of years, *as also was the doctrine that our planet was at rest*, but completely at variance with the unquestionable and valid testimony of nature. And it is *to such an interpretation as this*, that the geologist is directed to *modify the conclusions of science!* and by *its* guidance, and within *its* limits, to read the exalting and instructive annals inscribed upon the globe—annals registered as it were by the very finger of the Almighty Himself, appealing with the unsophisticated eloquence of truth, and with the venerable sanction of accumulated ages, to the respect and credence of mankind!

It is only when this received interpretation is presumptuously set up as defining the "proper" limits of scientific conviction, that any conflict is created between Geology and Revelation; or it should rather be said, is made to appear, between those distinct and independent authorities, for it can in truth have no real existence, since the works of God can never be at variance with His Word. Were the received interpretation to be abandoned for one consistent with the truths established in Geology, the validity of the text would be unimpeached, and would be freed from the impeachment

which, if that interpretation be retained, is inevitably cast upon it. The Holy Scriptures and the science of Geology are not rival or hostile authorities, incapable of concurrent reception; the question is not Geology *or* Scripture; on the contrary, each possesses an authority peculiar to itself and independent of the other; and the Mosaic text, when rightly interpreted, is perfectly consistent with Geology. And for any concession of interpretation which this science may require "from the too-literal interpreter of the Mosaic text," "Geology," says the Rev. Dr. Buckland, "more than compensates, by extending into a department of which revelation is wholly silent, the immutable foundations of that divine religion which shines in the Scriptures. The concession required," continues the learned Professor, "neither involves any impeachment of the Mosaic text, nor of the judgment of those who formerly interpreted it otherwise, in the absence of information as to facts which have but recently been brought to light."

The Mosaic narrative may be consistently interpreted as "in no way limiting the inferences, or even the speculations of Geology," with reference to the conditions of the globe during periods anterior to the creation of man, and to the epoch at which the Mosaic history commences.

Mr. Sharon Turner, a supporter of the received interpretation, in his Sacred History of the World, nevertheless admits the truth of this position, for he

observes, that in any fair interpretation of the commencing portion of Genesis, "the sacred historian gives the largest latitude for the investigations and deductions of geological science." Vol. 1. p. 491.

The following remarks, extracted from the Presidential Address of an accomplished philosopher and a sincere Christian, the Rev. William Vernon Harcourt, are too just, too eloquent, and appropriate, to be omitted here.

In his address to the British Association, in last year, the Rev. gentleman observes, "No one, I think, can doubt that those who condemned the Copernican system, were justified in conceiving that the Scriptures speak of the earth as fixed, and the sun as the moving body. Every one will allow also that this language is ill-adapted to the scientific truths of Astronomy. We see *the folly of any attempt on this point, to interpret the laws of nature by the expressions of Scripture;* and *what* is the *ground* of our judgment? We are not all competent to judge between the theory of Copernicus, and those which preceded it; but we determine against the seeming evidence of our senses, and against the letter of Scripture, because we know that competent persons have examined and decided the physical question. Now, Gentlemen, in Geology we are arrived at the self same point; that is to say, a vast body of the best informed naturalists have examined, by all the various lights of science, and by undeniable methods of investigation, the *structure of the earth;* and,

however they may differ in less certain points, they will agree in this—that the earth exhibits a succession of stratification, and a series of imbedded fossils, which cannot be supposed to have been so stratified, and so imbedded, in six days, in a year, or in *two thousand years, without supposing also, such numerous, such confused and promiscuous violations of the laws and analogies of the universe, as would confound not the science of Geology alone, but all the principles of Natural Theology. Here then, is another point of discordance; and, in this case the discordance lies between the language of Scripture and the truths of science.

"Who then would expect to find in Genesis the chronology or sequence of creation? Who can think that he upholds the authority of Scripture by literal constructions of such a history? As Astronomy shews the unity of the Creator through the immensity of space, so does Geology, along the track of unnumbered ages, and through the successive births of beings; still finding in all, the uniform Design of the same Almighty power, and the varied fruits of the same unexhausted Goodness."

* i. e. the alleged period between the Creation and the Deluge.

Chapter V.

Considerations arising on the Arguments which prove the portion of the Mosaic Text in question to be susceptible of altered construction, without affecting the sanctities of Revelation.

Having found in the investigations described in a preceding chapter, and more fully stated in the tenth, and two following chapters of the present essay, that the phenomena of organic remains, and the mineral structure of our globe equally declare the continued superintendence of Almighty Power and the exercise of beneficent design and prospective adaptation, and that the investigation of those phenomena cannot fail to supply the most exalting, the most instructive, and the most deeply interesting objects of inquiry, I proceed to consider the claims of the received and literal construction of the Mosaic narrative, as respects the Creation and the Flood, to interpret the language, and control the evidences of nature, and to fetter the conclusions of physical science in one of the most splendid departments of inquiry, to which the human faculties can be directed. And in these considerations, let it be borne in mind, that, in viewing the

conclusions of Geology with reference to Scripture, revelation is not in any manner called in question, or the foundations of religious faith affected or brought into discussion; that the fundamental doctrines of revelation are confirmed, so far from being injured, by the results of human science; and that the contradiction which certain well established conclusions of Geology, cannot fail to give to the received interpretation of a part of the Mosaic narrative, ought not to be considered as capable of casting any imputation upon writings derived from inspiration.

As the Holy Scriptures are of paramount authority on rules of faith and conduct, and on all subjects of a religious and moral nature, so the well-established conclusions of scientific research, and the unequivocal testimony of nature, must possess an equally paramount authority on all subjects connected with physical science or natural philosophy. So obvious, therefore, is the distinct and independent authority which Scripture and Science possess on their respective subjects, that to the candid and philosophic reader, unacquainted with the efforts which have been made to bring texts of Scripture into conflict with the truths of Geological Science, no proposition could at first sight appear more unnecessary or unjustifiable than that of considering Geology and Scripture with reference to each other; or, in different words, that of mixing up the testimony of Revelation, with truths disclosed in the

investigations of physical science. But the introductory portion of the Book of Genesis announces a history of the Creation of the world, and its subsequent visitation by a Flood; and although these were events which it was foreign to the object of the text to narrate, as matter of natural history, and events the narration of which is obviously not entitled to credence *as matter of testimony*; and although the record of such events could be accurately read in the Globe alone, mankind have been content to accept that announcement as conveying the true history of our planet. Before geological investigations had demonstrated the true history of the earth, the acceptance of that doctrine was justified by the absence of more valid means of information; but it unfortunately happens, that having once accepted, some persons have determined to retain and cherish it, though contradicted by the actual language of the Globe, the only valid historian of its own eventful conditions. For the sentiment, "So I believe, and so I will believe," is one which has long exercised its repressing and contracting influence. It is a sentiment which is characterized by the learned Dr. Watts as being "the prison of the soul for life-time, and a bar against all the improvements of the mind." And this sentiment, whose detestable and unworthy distinction it has been to oppose the reception of every great truth in science that advancing information successively disclosed, has in its turn been exemplified in the reception of Geological demonstra-

tions. It has, by most competent authorities, after discriminating and anxious attention, been considered clear that the Book of Genesis can never have been intended to convey an account which should furnish a natural history of the Earth; and this consideration supplies an *a priori* argument in favour of the admissibility of the altered construction which the unequivocal language of terrestrial monuments and records oblige us to place on certain portions of the Mosaic text. It is yet more plain, that the hitherto received interpretation is positively and unavoidably contradicted by the testimony of the Globe. But the Sacred Writings, of which the text thus wrongly interpreted forms a part, suffer no imputation by this variance, nor are the religious considerations involved in the authority of that text likely to suffer any danger or any compromise by its existence. For as an *a priori* course of reasoning is said to lead us to the conclusion, that this portion of the text is of all others the most susceptible of *an altered construction*, so the application of philological criticism and attentive reflection does most satisfactorily prove that the interpretation it has hitherto received is *not the only one* of which it is susceptible, and that a construction, in harmony with the established conclusions of Geology, may not only be consistently assigned to it, but when assigned, does actually furnish, where such a result could have been the least anticipated, an additional and a convincing testimony to the truth and inspiration of the Sacred Record.

This being so, it is astonishing and lamentable that persons should be so mistaken as to suppose the interests of religion to be staked on the preservation of the received interpretation of the Mosaic narrative, and that it should be still cherished with the degree of fanaticism incident to prejudices of a religious nature. And this too, although the interpretation that is capable of satisfactorily reconciling Geology and Scripture, has been gratefully received and adopted by more reasonable and philosophic minds, and by sincere readers of the Sacred Volume; and although the rejection of that altered construction places the sublime and poetically expressed accounts of the Creation which introduce the Mosaic writings, in conflict with the results of geological discovery; or, in other words, causes "those results in Geology which relate to periods *left wholly undefined* in the scriptural narrative, to appear at variance with the successive works of Creation, which are in that narrative *distinctly marked*."

To persons who would rather continue to believe in errors than concede their preconceived opinions, the startling truths unfolded in Geology were necessarily unwelcome. "Never, perhaps, did any science, with the exception of Astronomy, unfold in an equally brief period, so many novel and unexpected truths, and overturn so many preconceived opinions. The senses had for ages declared the Earth to be at rest, until the Astronomer taught that it was carried through Space with inconceivable

rapidity. In like manner was the surface of this planet regarded as having remained unaltered since its Creation, until the Geologist proved that it had been the theatre of reiterated change, and was still the subject of slow, but continual fluctuations."*

In the progress too, not only of Astronomy, but of some other studies of the highest importance to mankind, a similar opposition to preconceived opinions has resulted; for not only was the discovery of the earth's motion considered inimical to the authority of Scripture, and subversive of religion, but the sublime system of Newtonian philosophy was impeached, for it unfolded with regard to *Space*, those novel views which Geology does in regard to *Time*. And while those prejudices have long since yielded to the empire of reason, and been merged in admiration of systems that have introduced us to such exalting and magnificent sources of instruction, it is lamentable to find the enemies of the truth still opposing, with obstinate tenacity, the magnificent doctrines of geological science.

In the history and progress of Geology, as well as in its present position, illustrations are equally furnished of the repressing and injurious influence that prejudices, and especially those of a religious nature, exert in opposing and delaying the general reception and acknowledgment of truths in physical science. The geologists of the Huttonian school were long

* The language of Mr. Lyell.

compelled, on pain of incurring the charge of infidelity and atheism, " to work in chains forged by a presumptuous theology;" were " prohibited from looking beyond the Mosaic chronology;" were obliged to sacrifice to the narrow and artificial limits of an unnatural and unwarrantable, but a received, interpretation of the text, the splendid results of natural philosophy; and were permitted to ascribe to the peaceful deluge of the Scriptures alone, the " convulsions and dislocations which had every where shaken the interior of the earth," and the varied phenomena which so infallibly and clearly testified the repeated occurrence of far different and anterior events. In the then prevailing opinions respecting an Universal Deluge, geologists, on these accounts, endeavoured to find an explanation of facts, however irreconcilable with the character assigned in Scripture to that event. To the catastrophe of the Deluge, they referred the existence of marine deposits at the tops of the highest mountains, and to its irruptions they ascribed the inequalities of the earth's surface also, as well as the marks of violent action which have dislocated and upheaved even its solid strata; while the encroaching power of the sea, and the operation of still active and existing causes, were called in to support a theory, less the offspring of scientific induction than of an unphilosophical readiness to indulge, and compromise with, the received opinions of the day. But while, in England, fanaticism thus presumed to dictate to science, the

" unfettered genius of Cuvier was ranging over the primeval monuments and ages of nature," and openly declared the organic structures that he restored, to be the spoils of pre-existing worlds, and of the successive creations which had taken place upon the globe. The grand views proposed by that illustrious naturalist did not, however, meet with a ready reception here; nor was it till within the last few years, that geologists openly renounced all efforts to accommodate the language of the globe to the received interpretation they had been required to place on the brief narrative of Moses, and plainly declared that the respective declarations of Geology and Scripture could be reconciled only by adopting a change in the interpretation hitherto placed upon the Mosaic text, although that change went so far as to overturn the received chronology of the earth, and to compel the abandonment of the received interpretation of that text, as regards the doctrine of inorganic and animated nature having been consecutively created, and of that creation having taken place so recently as the period thereby assigned.

The following argument of an eminent philosopher, who is known to be a sincere friend to Christianity, is too much in point to be omitted here:—

" Let us consider," he observes, " what would be the conclusion of any reasonable being in a parallel case. Let us imagine a manuscript written three thousand years ago, and professing to be a revelation from the Deity, in which it was stated that the colour

of the paper of the very book now in the reader's hands is *black*, and that the colour of the ink in the characters which he is now reading is *white*. With that reasonable doubt of his own individual faculties, which would become the inquirer into the truth of a statement said to be derived from so high an origin, he would ask of all those around him, whether to their senses the paper appeared to be black, and the ink to be white. If he found the senses of other individuals agree with his own, then he would undoubtedly pronounce the alleged revelation a forgery, and those who propounded it to be either deceived or deceivers. He would rightly impute the attempted deceit to moral turpitude, to gross ignorance, or to interested motives in the supporters of it; but he certainly would not commit the impiety of supposing the Deity to have wrought a miraculous change upon the senses of our whole species, and then to demand their belief in a fact directly opposed to those senses; thus throwing doubt upon every conclusion of reason in regard to external objects; and amongst others, upon the very evidence by which the authenticity of that very questionable manuscript was itself supported, and even upon the fact of its existence when before their eyes."*

The fact is worth suggestion, that even if an altered interpretation of the text were not received, the fundamental doctrines of the creation, and those

* Mr. Babbage, Ninth Bridgewater Treatise, pp. 69, 70

leading points which may be supposed to have formed the immediate object of the sacred historian, in touching upon terrestrial events, are not injuriously affected, but, on the contrary, confirmed, by the discoveries of Geology. Thus, on the doctrine of the Creation, the monuments of the globe concur in declaring that the system of the world must have originated in the direct fiat of Omnipotence alone, and that "In the beginning God created the earth." They further declare that organic life also must have had similar origin, and have had a definite "beginning" after the creation of the globe. And, as if to establish the identity of that Design which has "effected so many similar ends through such a variety of instruments, the principle of whose construction is in every instance fundamentally the same," the researches of Geology prove that organic life was in its earliest periods, as it is now, complete in the specific character and anatomical development which declares its origin in the power of a Divine Creator; that there has not been a progressive improvement in organic life; and that the different genera have not devolved from preceding kinds, but that every living form possessed, at "creation's dawn," the original perfection, in generic as well as specific variety, by which it is now distinguished.

The discoveries of Geology thus confirming the declarations of Scripture, it must be with regard only to the periods occupied in the successive acts of creation described in the Mosaic writings, and

the order of succession of organic beings, that the text requires to be reconciled with the monuments of the globe.

To "simple believers" of the Mosaic text it seems to matter not, that on the only points on which the Christian religion could require a confirmation from Geology, its discoveries thus support and confirm the declarations of Scripture. They require also that Geology should "modify her conclusions" (!) to adapt them to the very letter of the Mosaic text. They have the ignorance and presumption to contend that we must grant the beginning of the world at the particular period they prescribe, or must, as they express it, "do without God" altogether. They acknowledge the Creator to have existed from all eternity, and yet they affect "religious horror" when required, says Dr. Smith, to go back perhaps a million of years in the history of his works. And because the discoveries of this science incontrovertibly establish that the earth had existence for uncounted ages, before it received its present form and present races of inhabitants, as described in the narrative of Moses; that it has been the subject of repeated fluctuation; and that it has been inhabited for myriads of ages by animals, for the most part totally unlike those last placed upon its surface; and further, that it experienced its changes of condition, and received its successive races of inhabitants at epochs immeasurably distant from each other, an injudicious comparison of these

startling truths with the declarations of the Mosaic text, as hitherto interpreted, made without reflecting that that interpretation is at fault, has excited the prejudices which an interpretation, for generations taught in childhood and retained in age, might be expected to involve.

It must be distinctly understood that Geology does not suggest the doubts (which have resulted from philological researches,) as to the claim of the introductory portions of the Mosaic text to the character of a direct revelation from God; nor is it the province of Geology to ascertain whether this portion of the narrative in the Book of Genesis has been interwoven from earlier writings. It evidently does not fall within the province of geological induction, to determine whether the introductory portion of the Book of Genesis is, or is not, of inspired origin; nor do geologists seek to raise or to discuss any such question. And it is in nowise incumbent on the natural philosopher to have regard, in the demonstrations of science, to any other authority than the Book of Nature; to be controlled by, or to consult any other authority as to the extent to which those demonstrations are to be carried; or to consult any preconceived opinions as to the inferences to which those demonstrations may legitimately tend. Nor can the validity of those demonstrations or inferences in the slightest degree depend on their conformity with the doctrines hitherto founded on particular portions of the Mosaic

text, or on their reconciliation with the prejudices involved in its received interpretation. It is sufficient for him to know that the Works of God cannot contradict His Word.

But persons who think it more fitting to construe the Mosaic text into a narrative of the eventful history of the globe, and to read its history in that construction rather than in the archives of nature, and who are unreasonable enough to doubt the testimony of the unsophisticated monuments which there plead to our conviction, because they fail, in historical particulars, to corroborate what those persons assume to be the testimony of the Mosaic narrative, reject the altered interpretation proposed to be placed on those portions of the text which, in their present acceptation, are inconsistent with the language of that record whose testimony they profess to state. Were the phenomena of Geology mere illusions, or creations of the fancy, and were its well-established conclusions the mere "speculations of mistaken men," Geology would not have been entitled to countervail the received doctrine of the Creation and the Flood, even in the historical particulars narrated in the Book of Genesis. But, however largely the conclusions furnished, or the testimony borne, infallibly borne, by the unsophisticated monuments of the globe may require us to depart from the received interpretation of the Mosaic text, that testimony, being the testimony of the globe, is paramount on its own peculiar province,

and must prevail over all written statements in reference to its history. But such is the unquestionable testimony of its phenomena, and such the infallible validity of the conclusions to which they lead, that—supposing the received construction to be the only one of which the record is susceptible—the text itself must yield to the conclusions of Geology; it being clear, that since Revelation cannot stand opposed to Nature, the variance could only be occasioned by the human means through which that Revelation has been communicated. But no such concession is called for by the truths of Geology. This being the case, and the present acceptation of the text in question being at variance with the evidences disclosed in geological research, an altered interpretation has been proposed by Geologists, for the purpose of reconciling in harmony the declarations of Scripture and of Science; and the grounds which recommend the adoption of that alternative are of a most satisfactory character.

I proceed then to state the arguments, which shew that the text is susceptible of the altered interpretation that has been proposed by Christian philosophers, for its reconciliation with the phenomena of nature.

The sincere reader of the Holy Scriptures, and the warmest supporter of revelation, may rest assured that he concedes nothing in point of substantial meaning, by the relinquishment of the present acceptation of those portions of the text

which are in the nature of a history of the earth, and which are foreign to the subject-matter of the Sacred writings. Arguments can be adduced, which raise a strong presumption against the Mosaic narrative having been designed to give information of terrestrial events *as matter of natural history*, (the strict character in which we have been accustomed to receive them;) and favour the conclusion that they must be mentioned there merely to announce the fact that all things were created by God, and to furnish a magnificent illustration of His unbounded power, His wisdom, and His government of nature. The announcement that all created things originated from the direct fiat of the Omnipotent, and the declaration of "His eternal superintendence over all the prior conditions of the world, from the epoch of its original creation, until He saw fit to give it its present character, and call into being its present races of inhabitants," must surely be the only points on which it could have been necessary that the Mosaic narrative should touch upon a subject so foreign to its province, as the natural history of the globe. All therefore that could be actually required, or be reasonably expected of Geological researches, would be that they should corroborate the testimony of the narrative upon those fundamental points, and that corroboration they have most satisfactorily furnished. And since it is unreasonable to expect that the results of scientific investigations in Geology, any more than in Astro-

nomy, Chemistry, or any other of the physical sciences, should be anticipated and announced in the pages of Scripture, it would be equally so to object to the sufficiency of the reconciliation established by the adoption of an altered interpretation, on the ground that it may not extend to the reconciliation with scientific truths, of those extraneous features of the Mosaic narrative which are not corroborated by the testimony of the globe. The testimonies of Geology, with regard to the events which affected the globe before it became the habitation of animated nature, and with regard also to the successions of life which occupied its ancient surfaces, before man was called into being, are the testimonies which render necessary a widely different interpretation of the text—and certainly we must be in a great measure prepared for the reception of that altered interpretation, if we consider that the reference there made to "the beginning," contemplates an undefined anterior period, sufficiently extended to admit the occurrence of those events.

We have reasons for believing that the historical portions of the text were not intended to bear a meaning strictly literal. Many other parts of Scripture are confessedly of a poetic character; and certainly events so grand and stupendous as the very creation of planetary worlds, and of systems of animated nature, were peculiarly liable to participate that character in their narration. The

design and object with which they were recorded is also to be borne in mind, as being a design and an object to which those characters of a sudden and consecutive performance, that are ascribed to the great work of Creation, by the text, would have been ancillary in a very high degree: and it is not unreasonable to view those characters in the light of additions, made in order to heighten the intended effect of the narrative.

The Rev. Professor Powell (referring to the commencement of Genesis and the fourth commandment) maintains that, in both cases, " the statement was not intended for an historical narrative; and if the representation cannot have been designed for *literal history*, it only remains to regard it as having been intended for the better enforcement of *its objects in the language and figure of poetry*; and to allow that the manner in which the Deity was pleased to reveal Himself to the Jews as accomplishing the work of Creation, was (like so many other points of their dispensation) veiled in the disguise of apologue and parable; and that only a more striking representation of the greatness and majesty of the Divine power and Creative wisdom was intended, by embodying the expression of them in the language of dramatic action." Connexion of Nat. and Div. Truth, p. 260.

The hypothesis thus proposed by the Rev. Professor, in order to reconcile the seeming discrepancies between the demonstrated facts of science and

the apparent representations contained in the Mosaic writings, has been objected to as imputing to the inspired record the character of a poetical or figurative representation, instead of the character of a plain historical narrative. But I humbly conceive that no serious objection lies to the hypothesis of the Rev. Professor on this ground, inasmuch as he clearly applies the character of "figure and poetry" to the "language" only, to the manner, that is to say, in which the events are narrated, and does not touch the reality of the things related. The dramatic form is allowed to be a mode of expression adapted,—to use the language of the Rev. Dr. Pye Smith, "by the graciousness of Divine condescension,"—to the perceptions and understanding of the uneducated people to whom it was addressed, and who, (in the language of that pious and learned author) would have been unable to receive spiritual sentiments, unless clothed in language borrowed from sensible objects and from the emotions and actions of men."

And yet it is by words and phrases thus suited to uneducated conceptions, that the verities of science are to be controlled — it is these words and phrases, that are to exercise a repressing influence upon the elucidation of scientific truths!

The obvious unfitness of the history of the globe for a subject of revelation, is a consideration of great weight,—the improbability that those extraneous features of the Mosaic narrative, which partake

the character of a natural history of the earth, should have formed the subject of a revelation to mankind in Scripture—and the unfitness of such a history to form part of that great code, whose object is to reveal and enforce the moral condition and obligations of man; are arguments of considerable force, and the unreasonableness of expecting the results of scientific investigation to be anticipated and announced in the pages of such a code, is prominent among the arguments under consideration. That the splendid and inexhaustible province of scientific investigations in nature, is not likely to have formed the subject of a revelation from God, is a consideration well supported by many valid arguments. This position was ably maintained by an able Biblical critic, the elder Rosenmüller, who, in his Antiquissima Telluris Historia, published in 1776, observes:—

"What can be a grosser absurdity, and even folly, than to require that Moses and the prophets should have spoken of divine truths, in the very infancy of the human race, according to the philosophy of Descartes, Newton, or Wolf?"

Accordingly we find that the representations of God, which are given in the books of Moses, are founded on the principle of ascribing to the Deity, the properties and the attributes which were then perceived among those to whom the statements were addressed. Every good writer must be presumed to speak according to the custom of the men among

whom he lives: and the great simplicity of the language of Scripture, is a remarkable evidence of its wise adaptation to the Divine object of revelation.

The Rev. Professor Buckland, also, forcibly illustrates the same point, by the following argument, which is admirably stated by that great authority in the following very argumentative passage, taken from the Bridgewater Treatise. Dr. Buckland observes—

"The disappointment of those who look for a detailed account of geological phenomena in the Bible, rests on a gratuitous expectation of finding therein historical information respecting all the operations of the Creator, in times and places with which the human race has no concern. And that as reasonably might we object that the Mosaic history is imperfect, because it makes no specific mention of the satellites of Jupiter, or the rings of Saturn, as feel disappointment at not finding in it the history of geological phenomena, the details of which may be fit matter for an encyclopœdia of science, but are foreign to the objects of a volume, intended only to be a guide of religious belief and moral conduct.

"We may," continues the Professor, "fairly ask of those persons who consider physical science a fit subject for revelation, what point they can imagine short of a communication of Omniscience at which such a revelation might have stopped, without imperfections or omissions, less in degree, but similar

in kind, to those which they impute to the existing narrative of Moses.

"A revelation of so much only of Astronomy as was known to Copernicus, would have seemed imperfect after the discoveries of Newton; and a revelation of the science of Newton would have appeared defective to La Place. A revelation of all the chemical knowledge of the eighteenth century would have been as deficient in comparison with the information of the present day, as what is now known in this science will probably appear before the termination of another age. In the whole circle of the sciences there is not one to which this argument may not be extended, until we should require from revelation a full developement of all the mysterious agencies that uphold the mechanism of the material world." Bridgewater Treat. p. 15.

No reasonable mind can, indeed, suppose that any revelation on subjects of physical science was intended to be made in Scripture, or that the allusions which its pages contain to the province of geological researches, are to be taken as any revelation of the history of the globe.

But to the adoption of an altered interpretation of the text objections have nevertheless been made, and as the result of an adherence to the hitherto received interpretation, is to make it appear that revelation is contradicted by the discoveries of science, by an authority which cannot be "remodelled" or accommodated to that interpretation, the

interests of religion demand that the Holy Scriptures should be vindicated from participation in such a result.

"I need not dwell," the Rev. W. Conybeare observes, "upon the extreme danger of representing as necessarily subversive of a faith in revelation, physical conclusions, received, I believe, by all those who are generally considered to be competent judges, as firmly established truths."

The vindication therefore, so desirable, would certainly be supplied in the consideration which philological researches are said to establish, that the evidence in favour of the introductory portion of the book of Genesis having been derived from the direct communication of Omniscience, is not complete, and consequently not such as to justify the representation which the infidel and the sceptic would gladly make, viz., that revelation is at variance with the discoveries of science.

That the announcements of revelation were not intended to bear a literal interpretation, is rendered obvious by one single and sufficient consideration, viz., that the sacred text attributes human organs to the Deity!

It is because the reconciliation which is established by the altered interpretation already proposed, has been considered as not extending to verify those extraneous features of the Mosaic narrative which partake the character of a natural history of the earth—(features which in themselves might weigh

against its title to the character of revelation,)—that the improbability of those extraneous features having formed a subject of revelation, becomes an important consideration. Certainly, if it were ascertained that they are irreconcileable with the phenomena of nature, that fact would be an answer to their claim to inspired origin. But, at all events, the want of reconciliation in those particular points could not affect the validity of other portions of the text.

If we were to conclude that the pages of revelation are unlikely to have been intended to convey a history of terrestrial events, it would follow that the contradiction which the discoveries of Geology have given to the received interpretation of those portions of the Mosaic text, in which the allusions to terrestrial events are contained, would not involve any disrespect to the Sacred Writings, or render necessary, with reference to religious considerations, any reconciliation of those passages with the conclusions infallibly established in the science of Geology, even if those passages would not admit of the altered interpretation which it has been proposed to place upon them.

There are many considerations which would justify the conclusion that the historical circumstances narrated—the only points which occasion any difficulty—indeed, any thing beyond the declaration of the earth's origin, and that of all created things in the fiat of Omnipotence, was not a fit subject for revelation in Scripture, and therefore if

the received interpretation of the historical narration in question, it being decidedly at variance with the testimony of nature, is the only one of which that text is susceptible, the argument would come to this, viz., that the respect due to writings derived from inspiration, is in no degree compromised by the variance which exists, according to the received interpretation of those portions of the text, between the Mosaic doctrine of the Creation and the actual testimony of nature.

The following arguments are to be observed in the consideration of this point.

Those statements contained in the Mosaic narrative, upon which our opinions of the history of the globe were wont to be founded, and the occurrence whereof in the Sacred Volume has occasioned the difficulties in question, are statements of events which clearly occurred in countless ages before the Creation of the human race. It is clear, then, that the character of such events, and the periods of their occurrence—periods so mysteriously remote—could not have been in any manner known to man when the Mosaic history was written, or the anterior writings, to which some authorities suppose it to be indebted, were composed, excepting indeed by means of geological induction, and that is a process on which it is evident the statements in question are not founded. So that taken apart from the consideration of inspired origin, and as a matter of testimony, the Mosaic record of such events would

fail to possess the corroborative support which would be derived from the veracity of the historian.

If the presence of circumstances which tend to negative the presumption of inspired origin, should suggest the alternative result, that the statements in question were derived from pre-existing documents, we should, on the legitimate deduction of that result, be ready, notwithstanding the occurrence of those statements in the Sacred Volume, to abandon them for the actual, and obviously preferable, testimony of nature, as commemorated in the unsophisticated monuments of the globe. Again, assuming the received interpretation of the Mosaic text to be the only one of which it is susceptible, and knowing that interpretation to be irreconcilable with the testimony of nature as deduced in Geological research, it would be idle to consider the claims of the narrative in question to inspired origin, if it were clear that the interpretation hitherto placed on it, is actually irreconcilable with the phenomena of nature, and is the only one of which it is susceptible. Besides, as it is certain that the works of God cannot be at variance with His word, and that a revelation from the Almighty cannot have been delivered in Scripture but to be contradicted by the more ancient and paramount authority of the revelation inscribed within the globe, it is evident that if the interpretation hitherto placed on the text is irreconcilable with the phenomena of nature, and if it is the only one of which the text

appears to us to be susceptible, it is very clear that either we do not possess the true reconciling principle—that the Mosaic text contains a meaning which we are not at present able to understand—or, that the narrative in question cannot form a portion of Divine Revelation, or have any claims to inspired origin.

It is neither the province of Geology, or the disposition of geologists, or any other scientific persons, to suggest any doubt as to the inspired origin of the Mosaic narrative of the Creation and the Flood. It matters not, whether the portions of the text under consideration be traced, by distinct and positive evidence, to the Divine Fountain of Truth, and be established as the pure words of Revelation, or whether the philological considerations already referred to, lead us to conclude that these particular portions of the text are of human composition, and thus liable to the incidents of other human compositions. The passages in question, being confessedly difficult and obscure, the construction we may place upon them cannot in either case affect the validity of Divine Revelation, the authority of which evidently rests upon distinct and independent considerations. In the one case, if there is any apparent inconsistency between the *words* of God, and the unsophisticated language of His *works*, we may feel assured that it is the fault of ourselves, and the result of our misunderstanding the sense in which those words are to be received. And, at all events

it is certain, that whatever construction we may be obliged to place upon them, such construction cannot in the remotest degree involve, or even question, the authority of Revelation, or compromise the respect due to the Sacred Writings. In the other case, we should feel the less hesitation in placing the right construction upon statements and passages, in which, from the very nature of the events narrated, it was so probable that any human writer would be mistaken. And moreover, the construction we might so place upon these passages could by no means affect, or compromise in any degree, the validity of the other parts of the Sacred Writings.

Now amongst the considerations above referred to, the following may without presumption be mentioned.

It has long been the opinion of many most able authorities, that the Mosaic narrative under consideration is not in the style of an inspired history, and that there are indeed circumstances which raise a fair presumption that it is of human composition. Several passages in the introductory part of the Book of Genesis certainly possess a synonymous structure, or in other words appear to be the collected fragments of different accounts of the same events. In the fifth chapter an account is given by another hand of the events mentioned in previous chapters, and in the seventh chapter, various relations of the same events are brought together. Many eminent authorities and able commentators

agree in the opinion that "it is sufficient to read it," (the Book of Genesis,) "to perceive that it was composed partly of the fragments of former works." Baron Cuvier so expresses his opinion.

It is remarkable, as shewing that the whole of one of the Books attributed to Moses, (the Book of Deuteronomy) was not written by himself, and as favouring therefore a presumption, from analogy, that the introductory portion of the Book of Genesis also may not have been his own composition, that an account of his own death and burial is contained in the former book.

The Rev. Dr. Smith's testimony is on this point also of great value :—

"The earlier part of the Book of Genesis," Dr. Smith observes, "consists of several distinct compositions, marked by their differences of style and by express formularies of commencement. It is entirely consonant with the idea of inspiration, and established by the whole tenor of the scriptural compositions, that the heavenly influence operated in a concurrence with the rational faculties of the inspired men ; so that prophets and apostles wrote from their own knowledge and memory, the testimony of other persons and written documents, to which indeed express appeal is often made. From the evidence of language and of matter we have no slight reasons for supposing that Moses compiled the chief parts of the Book of Genesis, by arranging and connecting ancient memorials, under the Divine

direction, and probably during the middle part of his life, which he spent in the retirements of Arabia. Thus, though it is impossible to affirm with confidence such a position, yet it appears far from improbable that we have in this most ancient writing in the world, the family archives of Amram and his ancestors, comprising the history of Joseph, probably written in great part by himself; documents from the hands of Jacob, Abraham, Shem, Noah, and possibly ascending higher still, authentic memorials from Enoch, Seth, and Adam." Dr. J. P. Smith. Relation of Scripture and Geological Science, pp. 207, 208.

The anterior works, from which we should be justified in supposing this part of the Mosaic narrative to have been composed, were probably intended to perpetuate the traditional belief of the nations in that early period of society, that the world and all created things had originated in the fiat of Omnipotence, and that a Deluge, that is to say, *the only event of the kind to which the memory of man extended,* had visited its surface. The superstitions, and the absurd mythology of the period would supply a multitude of extravagant additions to the mere facts narrated. And in fact, we have evidence, in the still extant traditions of nations, to whom we may have recourse on the subject, that the most imaginative features have been added to the events: features, which in different nations differ so much from each other, as to render

it difficult to identify the events, but which, nevertheless, agree so far in general character, as to evince some common origin of the traditional belief. Among written evidences of this diversity, are the profoundly ancient Sanscrit writings, which relate a history of the Creation and Deluge, implicitly received by the people among whom those writings have authority, but very widely altered in circumstances and acting personages, from the history preserved in the Mosaic record. And other ancient writings have been consulted, in all of which, peculiar features are added to the common belief; but those features are of the most extravagant character,—the histories abound in the most redolent imagery, and it is evident that their object has been to construct, from materials common to all, mythological fables, which should support the particular tenets of each.

To all the writings of the earliest periods, and to many parts of the Scriptures themselves, a confessedly poetic and figurative character attaches. Of poetic imagination many traces are discoverable throughout the sacred writings. And in relating such events as those which form the subject of our inquiry, it was more especially probable that imagination would have a share, and would suggest those figurative additions which were calculated to heighten the effect, or to give a more forcible and direct application to the subject of the narrator's work.

The design of the narrative was to declare the power, the wisdom, and the goodness of God; to exhibit Him as the architect of the globe, and to record His direction of human events, and His dealings with mankind. The Creation of the world and of its varied inhabitants, by the direct fiat of the Almighty, was a theme which, not only on account of it being an event founded in fact, and being also the prominent feature of the written and oral traditions then existing, but on account too of it being an event impressively declaratory of Divine interposition, power, and wisdom, was the best conducive to that design. With any other than this view, we cannot suppose the sacred historian to have referred to it. It was foreign to the object of his work to narrate the events of the globe as matter of natural history, and particularly, because, while the monuments of nature could themselves be consulted, no written statements on the subject could be necessary. A Deluge too,—such as that described in the Mosaic narrative,—was a visitation affording an instructive example; calculated to inspire astonishment and awe; and as an event having direct reference to the moral guilt of mankind, the sacred instructor could not have chosen a more impressive vehicle of warning, than by investing a great event in nature with the character of an instrument of retributive justice, or have urged a more signal instance of Divine Providence and mercy, than by representing the chosen family of the righteous patriarch, sus-

tained on the Diluvian waters, and spared to replenish the earth, from the face of which all but themselves had been swept away. Besides, we must recollect that the author of the narrative was giving the history of the posterity of Adam and of Noah, to themselves; and it was naturally flattering to that posterity that their ancestors should be represented, as having been selected for Divine favour.

Again, the Mosaic narrative does not furnish a complete history, even as to the first generations of mankind. Many events of human history are doubtless omitted, and as an instance, it may be observed, that the text omits any announcement as to the origin or descent of Cain's wife, who is mentioned, for the first time, at the 17th verse of the 4th chapter of Genesis. And a similar omission has occurred with regard to many other persons there named, although the narrative professes to give the genealogies of mankind.

The Rev. Mr. Harcourt, who supports the literal construction of the Mosaic text, in his "Doctrine of the Deluge," Vol. 1. p. 91., himself admits that "the object of Moses was to interest those for whom he wrote his history, and that he omitted events too remote to interest them." We cannot doubt such to have been indeed the case.

It is therefore most difficult to suppose that the Mosaic narrative can have been delivered as furnishing a complete history of the globe. In affirm-

ing, or repeating in his work the affirmation of, the doctrine that "God created the Heaven and the Earth," the sacred historian referred to a great anterior event undefined in point of time, and forming a leading feature which had direct reference to his object. It was not likely that he could have entertained the slightest suspicion of the events which had subsequently affected the globe;—nor, that he should have intended by noticing the Creation, which he did, as being a doctrinal, and the last physical event, the Deluge as being an historical and traditionary fact, to interfere with or prejudge the testimony of the globe, when the advancement of science should enable mankind to deduce and to understand it.

It does not follow that, because we cannot with certainty determine from the Mosaic narrative how the earth acquired its actual condition, we are to detract in any degree from the truth and dignity of the narrative in question. We have good reason to believe that the process by which, and the period when, this great work was accomplished, were not intended to form the subject of revelation; we know that they could not have been adequately described except in that profoundly scientific language which must have been unintelligible to those for whom the Mosaic history was originally designed, and consequently inapplicable to the purposes of revelation; and the suitableness of the actual announcements of the text to the capacities of unlearned society, as

well as their consistency with spiritual truth, corroborate the Divine origin of the Scriptures.

It cannot be supposed that those for whom Moses wrote or compiled this history, received it in any other sense; and why should we be so unjust as to consider that the silence of *a Sacred Code of morals and religion* upon the subject of *the physical mutations* which modern researches prove to have visited the globe, can impeach its validity, or place it in conflict with the testimony of nature.

Chapter VI.

The Conclusions of Geology considered with reference to the Doctrine which the Mosaic Narrative was thought to teach, as regards the Creation of the Earth, and of Animated Nature.

It is curious to contrast with the well founded conviction of the antiquity of our planet, which inevitably results from the phenomena disclosed in geological research, the hitherto received opinions of mankind with reference to the history and antiquity of the great theatre of their present existence.

In accordance with the hitherto received interpretation of the Mosaic text, and with the chronology which that text has been supposed to fix, it has

been held from one generation to another, that at a period not more distant than six thousand years the whole dependent universe, our globe itself, and the other planetary worlds, were suddenly created out of nothing; and that their creation was commenced and finished within six natural days; the creation of the heaven and the earth, the production of light, and the separation of light from darkness being the work of the first day; the creation of the firmament being that of the second; the separation of the dry land and seas, and the creation of plants, being the work of the third day; the making two "great lights in the firmament of heaven" being the work of the fourth day; and the creation of fish and fowl that of the fifth; and the creation of animals, and lastly of man, being the great and final work of the sixth day. And, that after a duration of about one thousand six hundred years, during which period no change is, by the Mosaic narrative, stated to have occurred, the Almighty brought a flood upon the earth which, for one hundred and fifty days prevailed upon the land, utterly destroying all living forms except those few saved by His special Providence in an ark. And further, that this supernatural Deluge was the only event of the kind that ever affected our planet. To these "years" and "days" were attributed the respective periods of duration which those words signify in our computation of time.

The testimonies of Geology with regard to the

remote antiquity of the globe, to the succession of organic life, the successive creations of animated beings and the periods of time which actually elapsed in those successive creations, and in the duration of particular conditions of the globe, most certainly contradict such an interpretation of the Mosaic text; and are totally at variance with the doctrine that the earth, and the orders of animated nature were created, and completed, in the period of six days, and that our planet and its first inhabitants were of cotemporary formation.

Having here repeated a fact so unwelcome to cherished prejudices, I must again beg that it may be distinctly understood, that the question is one of period only; that the facts of "a beginning" in the fiat of Omnipotence, and of the creation of the whole dependent universe by the hand of God, are, not only not called in question by geological science, but are, upon its own independent and decisive evidence, most completely corroborated and most amply confirmed. Those who are unwilling to admit the altered interpretation which the phenomena of Geology demonstrate the necessity of placing on the language of the text, have the stupidity to urge that the history of the earth must be taken up six thousand years ago, or the belief in its creation by the interposition of the Deity be abandoned, and that we must, (to quote their language) "do without God" if we carry back to immeasurably antecedent periods the duration of the globe—of monuments,

be it remembered, which unequivocally demonstrate, in all their periods, the immediate impress of His Wisdom and His Power, and which possess an authority so conclusive, and so superior to all other testimony on the subject, as to command and compel our assent.

As, therefore, the geologist finds in the phenomena of the globe, the startling evidences of its remote antiquity, and of the occurrence of successive eras of creation, each of which must have been separated by periods of incalculable duration, it is evident, that on contrasting all the decisive phenomena of the globe with the doctrine of its creation, of its adaptation to its inhabitants, of the creation of those inhabitants, and of the completion of its existing state, in the space of *six days*, the conviction must forcibly result that a far more extensive interpretation than that hitherto adopted, must be placed upon the introductory verse of the first chapter of Genesis, if not also, upon the period of time in that and in the following chapter, as well as in Exodus xx. 11, described as "a day."

It certainly is not a little inconsistent that "friends of Scripture" should be willing to do so much injustice to the Mosaic narrative as to allow it to remain contradicted by the evidences of vast duration which are presented in the fabric of the globe, when they know that by admitting an anterior period of undefined extent to be contemplated by the expression of "the beginning," if not distinct

periods or epochs by each of the "days" of Creation, any apparent inconsistency between the language of Scripture and the unequivocal phenomena of the globe is satisfactorily obviated. But, that if that limited interpretation of the Mosaic narrative which interferes with the demonstrations of Geology to the great anterior periods of which the text is silent, be adhered to, the sacred record is certainly rendered irreconcilable with the predominant testimonies of geological science.

The geological discoveries which have so widely altered received opinions, in regard to the antiquity of the earth and of animated nature, have already been considered; and we may pause in astonishment that, independently of their decisive force, an effort of mere unprejudiced reflection should not have convinced persons who received the literal interpretation of the Mosaic narrative, that it could not have been intended to bear the construction they have been led to attach to its language. And it is a humiliating instance of the tenacity of human prejudice, that although geological researches—the only valid authority upon the ancient history of the globe—infallibly demonstrated the errors of an interpretation which it is surprising should ever have been seriously entertained, that interpretation was not yielded to views more philosophic, and in particular to views satisfactorily demonstrative of the eternity, the uniformity, and grandeur, of a vast and stupendous system of prospective design—a system

which the geologist exhibits unchanging and in equal operation, through periods, in comparison with whose duration, received cosmogony dwindles to a day.

So far, however, from a "surrender at discretion" of confined and erroneous views in regard to the duration of the Creator's works, and the operations of His Power, the supporters of that childish interpretation of the Mosaic text which I have stated to have been religiously cherished, have thought proper to set it up not only as prescribing the limits for geological discovery and doctrine, but as the only interpretation which may be placed on the language of the Mosaic record.

As the progress of geological induction in the present age is not very likely to be retarded by or fettered within any limits which evangelical prejudice may find it convenient to prescribe, the efforts of the Christian philosopher need alone be directed to the refutation of the doctrine, that the received interpretation of the Mosaic text is the only one that can be placed upon its language. I rejoice that I am enabled to anticipate the result of the arguments I am about to repeat and bring forward on this head, by stating that an interpretation which is consistent with itself, and with the positive testimonies of science, may be satisfactorily placed upon the Mosaic text.

The hypotheses which have been suggested for the purpose of reconciling the facts established in

Geology, with the brief narrative contained in Scripture, are of two kinds—the one geological, inasmuch as the line of argument deals with physical causes; and the other critical, as dealing with the interpretation to be placed on the language of the Scriptural record.

Two theories of the first kind have been proposed. One of them supposes the formation of all the stratified rocks to be due to the Deluge announced in the Mosaic narrative; the other, regardless of the phenomena of their organic remains, assumes that they were formed beneath the sea, during the interval which elapsed between the creation of man, and the occurrence of the Flood, at which time the hypothesis requires it to be supposed that the then existing land sunk and was submerged, and that the marine bed rose to form the post-diluvian, and present continents of the globe. It happens, unfortunately for their supporters, that both these theories are unquestionably demolished by a correct attention to geological facts, and to the actual phenomena for which those theories attempt to account. Even to a reader not practically conversant with the facts I have already adduced, as establishing the high antiquity of the earth, it must be clear that such varied phenomena as are there described, such a vast thickness of stratified deposits, such endless subdivisions in their characters, and such chronologically arranged successions of organic remains enclosed in those deposits, with the

clearest evidences of slow and gradual accumulation in long periods of time; must be utterly irreconcilable with an hypothesis which seeks to ascribe all stratified rocks, either to the effects of the Mosaic Deluge, or to a sub-marine formation during the interval between the creation of man, and the occurrence of the Mosaic Deluge, at the period of which event, the hypothesis supposes a coincident interchange in the then existing land and sea.

The hypotheses of the other kind, which have been proposed both by eminent geologists and learned divines—proposed too, on independent grounds, are of a very different, and really satisfactory nature. Some theories, it is true, have been suggested on critical grounds, which fail satisfactorily to establish the desired reconciliation, since it can be completely satisfactory only when in harmony with the clear meaning of the Scriptural narrative, with the peculiar character it possesses, and with the obvious use of its language, and when the text is susceptible of an unforced reconciliation with Geology by an altered interpretation, arrived at upon purely critical grounds, and independently of geological evidence.

It is in conformity with these conditions that it has been proposed, that the Mosaic narrative of the Creation is susceptible of a different interpretation to that hitherto placed upon its language.

The philological explanations of the introductory clauses in the book of Genesis, which have been

proposed as the means of reconciling the Scriptural announcements with the discoveries of geological science, are now to be considered. Of these, the explanation first suggested by the Rev. Dr. Chalmers, the Professor of Divinity in the University of Edinburgh, proposes the consideration that "the first day of the Week of Miracles recorded at the commencement of Genesis begins with the announcement that 'the Spirit of God moved upon the face of the waters.' The detailed history of the present order of things will thus," continues the Rev. Professor, "begin with the middle of the second verse; and what precedes is regarded as an introductory clause, by which we are aptly told, that God created the world at first; and that afterwards (at what interval is not specified) it relapsed into chaos. 'In the beginning,'—it does not state how long ago, 'God created the Heaven and the Earth. And the Earth was without form and void,'—it does not state at what distance of time from the original creation recorded in the preceding verse. By this view it will be seen that the original creation forms no part of the first day's operations. In the interval, for aught we know, the world may have been the theatre of many successive changes, of which the indications are still to be traced by philosophers. We never hear of any thing else coming from the hand of God imperfect. 'Without form and void.' All the rest are eulogized; and pronounced 'very good.' We are not, then, to understand those terms

as describing the state of the earth when first created; but after an indefinite lapse of ages and of centuries. This would permit an indefinite scope to the researches of geologists." Dr. Chalmers, in fact, supports the position, that the first creation of the Earth and the Heavens may have formed no part of the "week of days detailed in Genesis;" that the first verse describes only the primary act of Creation; the first half of the second verse the state of the earth (which may have existed for ages previously) at the point of time anterior to the operations subsequently described in the first chapter; that they commenced with the moving of "the Spirit of God;" that the creation of Light was the great and leading event of the first day; and that Moses may be supposed to give us, not a history of the first formation of things, but of the formation of the present system.

It is satisfactory that the opinion thus advocated, of there having been a chaos of indefinite continuance between the first creation of the Earth and the first "day" of the successive creations, is supported by the eminent authority of Bishop Patrick.

The interpretation proposed by the Rev. Professor Buckland, for the purpose of reconciling Geology and Scripture, proceeds upon the supposition, not that the first verse, and first half of the second verse, but that the first verse itself, refers to an undefined anterior epoch, during which the earth had existence as a planet,

though organic life had not then been called into being. The Rev. Dr. Pye Smith concurs in the former branch of this supposition, but conceives that organic life is to be understood as having existed on the globe, during the undefined period referred to.

The Rev. Professor Buckland, I believe, proposes, that by each of the "days" of successive operations, indefinite periods of long duration, answering to the distinct periods of succession established in geological researches, should be understood; and it appears that the evidences of the earth having slowly acquired its present state, and having, at different times, long existed in states unlike the present, may thus be reconciled with the testimony of the sacred record. To this proposition, the Rev. Dr. Smith objects, and he contends that the adjustment of the terrestrial surface, and the creation of its now existing races, was completed in six natural days, or diurnal revolutions of the globe.

Professor Phillips supports the view proposed by Dr. Chalmers, Dr. Buckland, and Dr. Smith, in regard to the first verse being understood to refer to an undefined anterior period, and remarks, that "the Mosaic record of the creation of mankind, and of the forms of organic life which are still perpetuated on the globe, does not in any manner define its earlier conditions, except by affirming* that it was formerly in a different state, especially as to its enrichment with living beings, from that which it

* Genesis i. 1, 2.

exhibits to us at this time." Mr. Sharon Turner does the like.

These considerations are entitled to receive great weight, and more particularly the theories which consider the narrative of successive creations as having its commencement at the period when the earth was emerging from some anterior condition, and as admitting the occurrence of indefinite periods of time in the gradual acquirement of the successive creations there described. It must nevertheless be confessed, that objections have been made to these methods of explanation; and that although it may be satisfactorily shewn, and upon strictly philological grounds, that the Mosaic text is susceptible of such an interpretation as will render its announcements consistent with the testimonies of natural monuments, none of the methods of explanation to which I have referred, are totally free from objection. The explanation which proposes that the state of the earth immediately before being adapted and furnished for the residence of its successive races of inhabitants, was one of chaotic dissolution from some preceding condition, is liable to the serious objection that the facts disclosed in Geology do not shew that any such condition ever existed. The Rev. Dr. Smith's hypothesis, that only a particular locality on the earth's surface, and not the whole earth, was the subject of the successive operations detailed in the Mosaic narrative, would certainly be an answer to the objection

founded on the total want of geological evidence to the existence of the supposed chaotic state, since some great natural operations might have been sufficient to produce in a particular locality the condition described. Other, and more serious objections to such an explanation, *seem* to arise from the consideration that the creation of the Sun, the Moon, and the Planets, and the creation of light, are narrated as events subsequent in chronological order, whereas the siderial system of which our planet forms a part, must, as well as light, have been created and had existence, long before the period in which the earth was brought into the supposed chaotic state of ruin after some previous condition. The objections which thus arise are met, it is clear, by the reflection that the word used to express Creation does not necessarily imply creation out of nothing; that it equally means formation or arrangement of existing materials which had been previously created; and consequently that the heavenly bodies, as well as light, need not be understood to have been then first created, but then first made visible. The supposition that the Mosaic narrative proceeds, not in order *historically*, but in order *visibly*, has been suggested even by Mr. Granville Penn, and he proposes that the announcement may be taken to mean, not that the Sun, Moon, and Stars were then first made, but that they were then first *made visible*. This must surely mean, to the newly created inhabitants of the globe, for that

those bodies were visible had there been human eyes to behold them—that they must have shone upon the earth, from the moment that they and the earth first cotemporaneously existed, is not only self-evident, but is rendered certain by the existence, in the fossil condition, of eyes, and the relation of those eyes to light, in the myriads of organic beings which abound throughout the stratified formations, and must evidently have belonged to that ancient system of things, which the hypothesis now under consideration supposes to have preceded the occurrence of the chaotic state with which it assumes the era of more recent systems of creation to have commenced. The Rev. Dr. Chalmers himself remarks, that the main difficulty in receiving that hypothesis lies in the fourth day, which details the creation of the Sun, Moon, and Stars: but "Rosenmüller," he observes, "says of the fourth day, that any one conversant with the construction of the Hebrew, will know that the expression used in the fourteenth verse, imports the direction or determination of the heavenly bodies to certain uses; not "'let lights *be*,'" (or *be made*,) separated from the rest of the sentence; but "'let lights be *to divide the day from the night*,'" &c. The verb is in the third person singular, and the noun (lights) in the nominative plural, "'Let *it* be that lights, in the firmament of heaven, divide the day from the night.'" And it appears to me that this difficulty would lose its force if we were to arrive at the conclusion, (which

I shall presently shew to be a justifiable one,) that the acts of Creation are not to be understood as having taken place in the exact chronological order in which they happen to be narrated; such a conclusion indeed would seem to be sufficiently supported, and at all events as far as regards the celestial bodies, by this one consideration, viz.—That the formation of the celestial bodies did not take place on the fourth day, or at any period after the formation of the Earth as a planet, is incontestibly clear, for it is certain that the Earth could not have existed as a planet without them. The relations of the several bodies which form the Solar system to each other, as parts of one great whole, and the unseen but stupendous agency of gravitation through which they are wondrously sustained in their orbits, establish an unseen but not less evident mutual dependence, which demonstrates that the Earth cannot have existed before the creation of the Sun, and of the planetary worlds of, at all events, that Solar system of which it forms a part. Besides, the doctrine that these magnificent worlds were made for *our use*, *made* "to give light upon the earth," and "to serve for signs and for seasons, and for days, and for years," and were created only to be ancillary to our enjoyment of the globe, possesses too much child-like simplicity to be accepted literally, by any more enlightened age than that in which the Scriptures were supposed to teach, and the Inquisition commanded the belief, that the

whole siderial system was in diurnal rotation round the earth, as the immovable and central globe.

Again, the second verse of the first chapter of Genesis, announces that "the Spirit of God moved upon the face of *the waters*,"—while at this stage, the waters are not stated to have been created; their existence may however be implied by the term "Earth," which no doubt means the earth as a globe of land and water subsisting. In subsequent verses the creation of land, and of the waters is expressly mentioned; and if a priority in date be given to the second verse, the subsequent announcement must be superfluous, since waters, "upon the face" of which "the Spirit of God moved," had previously existed. This previous existence is precisely the point which is contended for, in supporting the interpretation proposed by Dr. Chalmers.

So, before the creation of the sun and moon is mentioned, the evening and the morning are expressly referred to; and as no evening or morning occasioned by the diurnal rotation of the globe can have taken place without the existence of the sun and the other planets, it is clear from the language of the text itself, that they must have been in existence, and the earth had rotation, before the time at which, in order of narration, the sun is stated to have been created. And therefore, with regard to these expressions, if the creation of the sun and moon be held not to have taken place until the fourth day of the Mosaic history, the contradiction

will arise, that there can have been no previous evening and morning on the globe. —The expression "the evening and the morning," is in truth the only stubborn difficulty in the case; and as the Mosaic narrative does not announce, that on the first day God created the earth, on the second the firmament, and so on, the intervention of "the evening and the morning" between each succeeding act of creation, is the only circumstance that gives colour to the hypothesis which supposes a day to have intervened between these successive works. The doctrine of the earth having been created in six days, is nevertheless only a conclusion which *we*, unnecessarily as it appears to me, draw from the records of revelation.

A difficulty seems to occur from the statement of the appearance of light on the first day, the apparent sources of light, the sun and moon, not being mentioned until the fourth day:—but this difficulty seems to be solved by the consideration that the words "Let there be light," (Gen. i. 3.) need not be taken to imply that light had not before existed. "I learn," says the Rev. Dr. Buckland, "from Professor Pusey, that the words '*let there be light*,' *yehi or*, Gen. i. 2, by no means necessarily imply, any more than the English words by which they are translated, that light had *never* existed before. They may speak only of the substitution of light for darkness upon the surface of this, our planet: whether light had existed before in other parts of God's creation, or had existed upon this earth, before the

darkness described in verse 2, is foreign to the purpose of the narrative."* "If," continues the Rev. Professor, "we suppose all the heavenly bodies, and the earth, to have been created at the indefinitely distant time, designated by the word 'beginning,' and that the darkness described on the evening of the first day, was a temporary darkness, produced by an accumulation of dense vapours 'upon the face of the deep;' an incipient dispersion of these vapours may have readmitted light to the earth, upon the first day, whilst the exciting cause of light was still obscured; and the further purification of the atmosphere, upon the fourth day, may have caused the sun and moon and stars to reappear in the firmament of heaven, to assume their new relations to the newly modified earth, and to the human race."†

It would seem, then, that the objections, (founded on the supposed chronological order of the successive creations, detailed in subsequent verses,) to the interpretation which admits an anterior period of undefined duration before their commencement, are not such as to invalidate the position recommended by Dr. Chalmers, Professor Buckland, Dr. Smith, and other eminent authorities; and consequently, that for anything those objections urge to the contrary, we might adopt the supposition, that the history of the successive operations begins with the middle of the second verse; that between their com-

* Bridgewater Treatise, p. 26. Note. † p. 30.

mencement and the first creation of the globe, a period of undefined extent, sufficient to meet the time required by the discoveries of Geology intervened; and that that first creation, and the beginning referred to in the introductory verse, formed no part of the "week of days" mentioned by the sacred historian.

But then a difficulty seems to present itself; inasmuch as it is clear that the successive operations supposed to have been completed in the six subsequent days, did not *first* take place after the occurrence of that chaotic state into which the earth is, by the hypothesis, supposed to have relapsed immediately before the period when it pleased the Creator to adjust its surface for a new order of things, for the reception of the animal and vegetable tribes by which it is now inhabited, and for the present order of Creation, the last manifestation or exercise of His unspeakable beneficence and boundless power. Before the undefined period here supposed, can be understood to refer to a condition in which organic life had not began to exist upon the globe, it seems to me that it ought to be made apparent that we can, consistently with the actual phenomena of the globe, understand the successive acts of Creation, which called into being the various races of organic life, to have had their first commencement at so recent a period as that when the existing system commenced. But the language of the subsequent verses of this portion of the Mosaic

narrative, does not admit such a construction as would be consistent with the testimonies of Geology to the varying conditions of the globe, after life had began to exist upon its surface, to the distinct successions which are marked in fossil organic remains, and to the successive creations unlike the present, which flourished through periods of vast extent, and passed away from animated creation, before the commencement of the existing order of things; unless the successive "days" of Creation be understood to imply periods of undefined duration, and sufficiently extended to be consistent with those evidences. Nor is the supposition that life *had* existed throughout the anterior period, the close of which is, by the hypothesis, understood to be indicated in the second verse of the Mosaic narrative, satisfactorily reconcilable with the announcement contained in the subsequent portions of the text, that organic life first began to exist after the close of that anterior period, and on the commencement of the new order of things. For the announcements there contained would have to be considered as referring back to that anterior period, unless, indeed, it be admitted that the creation of the present system of animated nature, as the system with which the human race is immediately concerned, was the only one noticed by the sacred historian. An interpretation which should regard the successive operations of the six days, as having relation back to the events of that undefined anterior epoch only, would not be satisfactory, more

particularly as the supposition, that those announcements refer only to the creation of existing orders, is not only consistent with the context of the narrative, but with that intention of referring only to events wherein the human race were concerned, which we consider to be apparent in the sacred text.

The construction which is the most consistent with the facts established in geological research, appears to be, that the first verse should be considered as an abstract and independent announcement, that the heaven and the earth were created by God, at a period of "unmeasured distance" from the subsequently described operations of the first day; that the successive creations afterwards described, do not refer to the creation of those various orders of animated beings which successively inhabited the globe, before it received its present races of inhabitants, and its present condition. And that even as regards the creation of existing races of plants and animals — that system of creation which was called into being, on the close of the anterior condition,—the successive acts described in the subsequent verses of the first chapter of Genesis, need not be understood as being contemporaneous with the creation of man, for that the "days" of creation may be consistently interpreted to mean periods of great extent.

In proposing to interpret the "days" of creation to mean great periods or epochs, and not the time of a diurnal revolution of the globe, the Rev. Pro-

fessor Buckland observes:—"If the suggestions I shall venture to propose, require some modification of the most commonly received and popular interpretation of the Mosaic narrative, this admission neither involves any impeachment of the authenticity of the text, nor of the judgment of those who have formerly interpreted it otherwise, in the absence of information as to facts which have but recently been brought to light; and if in this respect, Geology should seem to require some little concession from the literal interpreter of Scripture, it may fairly be held to afford ample compensation for this demand, by the large additions it has made to the evidences of natural religion, in a department where revelation was not designed to give information."

That interpretation is much supported, by the consideration arising on the different senses in which the word "day" is employed at different parts of the Mosaic text. It appears that the expressions "at the end of days," and "in process of time," are synonymous translations of this elastic word. The Mosaic text, in another place, announces that all *the days* that Adam lived were nine hundred and thirty *years*, —of this, there are many similar instances. And in the second chapter of Genesis, an epoch is clearly referred to, by the expression "*In the day* that the Lord God made the earth and the heavens." The word "day" is employed in other portions of the sacred Scriptures to denote time itself. This is apparent in many passages—for instance, in Isaiah,

chap. xiii. 6, 13, 22.—"The *day of* Jehovah is at hand."—"I will shake the heavens, and the earth shall tremble out of her place, in the *day* of the wrath of mine anger."—"Her time is near to come, and *her days* shall not be prolonged." And again, "Her antiquity *is of ancient days;*"—"And it shall come to pass in *that day*, that Tyre shall be forgotten seventy years, according to the *days* of one king;"—xxiii. 7, 15. It is remarkable too, that "the beginning" is by the Prophets called "the day of antiquity."

And it may be inferred from the following passage in the first chapter of Genesis, at the twentieth verse, that the acts of creation were not each separated by *natural days.*—"And God said, Let the waters bring forth abundantly the moving creature that hath life, and fowl that may fly above the earth, in the open firmament of heaven. And God created great whales, and every living creature that moveth." —Where the sacred historian proceeds to relate the operation of this fiat on the creatures thus created, by adding—"which *the waters brought forth* abundantly after their kind, and every living fowl after his kind: and God saw that it was good."

It has been objected to the interpretation thus proposed, that the institution of the Sabbath is in itself a commemoration of the miraculously completed work of creation, and that the Divine commandment as to the Sabbath day, which is delivered in the Book of Exodus, is a corroborative support of

the received interpretation placed upon the history recorded in the Book of Genesis. It is true that such a relation is declared by the reason which is assigned at the eleventh verse of the twentieth chapter of Exodus, in recording the commandment of God to keep holy the Sabbath day, viz., "*For* in six days the Lord made heaven and earth, the sea and all that in them is, and rested the seventh day," &c. But it is the counteracting and remarkable fact, that in the Book of Deuteronomy, the same author, in recording the commandments, has there, at verses thirteen to fifteen of the fifth chapter, absolutely assigned a very different reason for the institution of the Sabbath, for it is there said, "Remember that thou wast a servant in the land of Egypt, and that the Lord thy God brought thee out thence through a mighty hand and by a stretched out arm: *Therefore* the Lord thy God commanded thee to keep the sabbath day."

It is further objected, that the admission of the learned Professor's suggestion would not be consistent with the Sabbath, because the nature of the institution necessarily defines the limited interpretation to be placed on the word "day" there employed. But this objection may be answered, if periods of various duration be admitted to have been represented in different passages by the word rendered "day." Certainly such an admission is very justifiable.

With regard to the construction to be placed on

the introductory statements of the Book of Genesis, a very great inconsistency is apparent in the opinions and writings of many persons who contend for its most literal interpretation; for they do so, and yet at the same time acknowledge that they either understand an undefined period of anterior existence of the world to be contemplated in the first verse of the introductory chapter, or believe in a natural impossibility. Thus, it is admitted in the note to the fourth chapter of Goldsmith's "History of the Earth," (page 28 of Captain Brown's edition,) that there are rocks (the primitive series) "which were formed in the uninhabitable state of the globe;" —but according to the literal interpretation of the Mosaic account, which the consistent annotator recommends to the Christian's "preference," the globe may have been habitable from the beginning; or at all events the uninhabited, if not the uninhabitable, condition of the globe, was not of longer duration than one or two diurnal revolutions, a period insufficient for the formation of the primitive series. In the same place it is further admitted, that "subsequently to this period, but before the mountains appeared above the ocean, and before the creation of vegetables and animals, the whole class of rocks forming what are called the secondary series were deposited." And again, that the whole of the series of transition rocks were formed while the earth was passing from a chaotic to a habitable state.

The "geological periods, the catastrophes and

epochs," which the annotator unnecessarily views as so inimical to Christianity, seem nevertheless to be here pretty clearly implied by his own statements.

This subject is placed in a striking point of view if we have regard to the varied character of these three leading systems of rocks,—if we take into consideration the well demonstrated fact that they mark the occurrence and long prevalence of vast changes and revolutions of the globe,—and if we remember that most of the strata are stored with organic remains,—those of animals and plants of classes, genera, and species, which are both existing and extinct, the anatomical structures of which declare successive creations adapted to different conditions,—that the genera change with the strata; that many of the genera and species no longer exist; that particular races characterized particular periods, all the successive generations of a particular genera being often found in one particular series of strata —and that these remains occur under circumstances which conclusively indicate the accumulation of uncounted ages: and that the unequivocal testimony which is thus borne, is corroborated by an endless variety of other geological phenomena.

It certainly, then, must be clear, either that the introductory statements in the Book of Genesis are understood by the writers who contend for a literal interpretation, to contemplate, though they omit to notice, the lapse of uncounted ages before man was placed upon the globe, or that those writers, advo-

cating a construction which is supported by the acquiescence of ages, *but contradicted by the only valid authority upon the subject*, believe, on the authority of a false and unnatural interpretation of those statements, that the phenomena referred to, were produced in one or two diurnal revolutions of the globe.

It is perfectly clear that the great work of creation, and the successive acts of creation, and origin of all created things, are wonders very far beyond the scope of human reasoning, wonders, to explain which, all knowledge of natural properties and laws is utterly insufficient, and to suggest the means and process of which, the most profound philosophical research is wholly unavailing. But though it has, at all events in the present stage of existence, been denied to human intellect to fathom these depths, it has been the pride of human science,—as it is the ordained and legitimate province of human intellect, —to achieve the noblest and most exalted demonstration that could reward its efforts,—the demonstration of the Creator Himself, throughout His works, from periods immeasurably prior to the era of our race.

Though the means by which creation was accomplished, be so far beyond the reach of human reasoning, the records of creation preserved in the fabric of the globe, are, however, properly within its scope. And although they illustrate events inconceivably remote, their evidence is clear and unequivocal; and it possesses so primary and decisive an

authority, that we are bound to read the Mosaic narrative of the great work whose records we contemplate, with the scientific light derived from the researches of Geology and tributary science.

And when we call to mind, that " parts of the Mosaic narrative are very obscure, that some expressions throughout are very general, and others, in the opinion of some of the most learned commentators, figurative," we ought to be the better reconciled to the adoption of that construction of the text which, although different to the generally received interpretation, is one that completely reconciles the testimony of Scripture with the authoritative and unbending language of the globe.

Even if we were not by that language compelled to conclude that the narrative in the book of Genesis is, at all events in the instances under consideration, so far poetic and figurative in its character, as to admit of a construction not strictly literal, we might fairly inquire why we should suppose this part to be exempted from participation in the confessedly poetic and figurative character of some other parts of the sacred writings. Events so sublime and so remote,— events, as to which, none but geological knowledge could control or gainsay the creations of a fervid imagination, were surely those which became the most likely to receive in their relation, a poetic and figurative character. And we might even consider the sudden and consecutive performance of the great work of creation, as de-

scribed in the first chapter of Genesis, to have been a poetic feature introduced in order to heighten the desired effect: and in ascribing this object to the writer of the narrative in question, without presumption, recognize a sufficient motive for attaching the features of sudden and consecutive performance, to the great event announced. For a more happy method of impressing on the minds of the people for whom the history was written, a probably new, and certainly most exalted conception of the Creator's power, could not have been chosen, than in representing the miraculous origin and completion of all created things, within a period of six days.

If the six "days of Creation" were so designed in the narrative, in order to heighten its effect, it must, on that account, not be interpreted literally. If they were not so designed, still it is obvious that the word "days" may be interpreted to mean epochs of distinct creation, and that they were separated by incalculable periods of time. It may at first sight be objected, that if the days of creation were invented by the writer of the history in question, the whole force of the supposition, that they were introduced to declare the incomprehensible and stupendous power of the Almighty, would be derived from the limited, rather than the extended acceptation of the word "day," among the people to whom the statement was addressed. But such an objection would be answered by the consideration,

that a figurative statement may have been received literally, and that the word "day" may have signified periods of different duration: and the sense in which it was intended that the statement should be received by those for whom it was written, may be supposed to have been indicated or defined by the announcements that "the evening and the morning were the first" and following "days." The objection above suggested, therefore, would not militate against the argument for the figurative character of the composition, so far as that argument is affected by this particular point.

But we have seen that the facts of Geology do not require us to attach a figurative character to the Mosaic narrative even in this respect, if the word "day" may be interpreted to mean an epoch, as well as the period of a diurnal revolution of the globe; and the expressions "the morning and the evening," may be interpreted to mean *the dawn and close of the successive and distinct creations* to which the phenomena of the globe, or rather of organic remains, bear testimony. May it not be perfectly consistent with the meaning of the context, that we should interpret "the evening" to mean every preceding state, or the close of every preceding state, and "the morning" to be an expression which has respect to new creation?

In the absence however of geological knowledge, the people for whom the history in question was written, can hardly have placed such an interpre-

tation on the expression, "the evening and the morning;" and this renders it probable, that they were used by the sacred historian in a figurative sense, and that the error has arisen from attaching to those expressions their present literal acceptation.

"It will," the Rev. Dr. Smith observes, "appear evident to any one who will reflect upon the case, that the records of revelation must have been written in the phraseology and idioms of the people and the age to which they were given; or they would have been unintelligible. Upon this principle we account fo the manner in which natural phenomena are currently described; and for the expressions which impute to the Infinite Spirit the form, the organs, and the mental affections of a human being; and various other characteristics of the parabolic style of the Hebrew Scriptures. Such language was a condescension to the infirmities of mortals, and best adapted to the instruction of the general mass of mankind; but it is self-evident that it must be interpreted in a manner congruous with the perfect attributes of the Deity, and the reality of things." Suppl. Notes to Relat. of Script. and Geol. p. 427.

So that, whether the narrative be considered figurative, or the interpretation uncertain, a construction may be placed upon it which does no violence to the clear meaning of the text, and by which the respective declarations of Geology and Scripture can be satisfactorily reconciled. And to do this it appears only necessary to disconnect the narrative

in point of time :—to understand by the statement that " in the beginning God created the heavens and the earth," that a distinct, anterior period is referred to ; and by the description of the earth's condition previous to the " days" of creation, an interval or period of extended duration, during which great convulsions may have occurred ; and, we have seen also that the detailed account of the order in which the Almighty furnished the world during the six " days" of creation, may be interpreted to mean a succession of distinct epochs unconnected in point of time.

The proposition that the first verse of Genesis is an independent statement, and refers to a period anterior to the commencement of the successive operations afterwards described, is corroborated by the language of the text itself; for that verse announces that " In the beginning God created *the heaven* and the earth ;" but the earth only is the subject of several immediately succeeding verses : and it is a legitimate conclusion, that they refer to the operations of the creative Power upon a subsequent condition of the earth, so, in the first verse, stated to have been created. And a period or epoch, during which the earth was in an uninhabited state, seems to be recognized by the very order of the text itself, for, according to its announcements, light had been created, the firmament made, the waters divided, the seas gathered together, and the dry land had been made to appear, before the fiat was given that the

earth should bring forth grass, the herb, &c. The sixteenth verse announces in three words (and, as it has been remarked, almost parenthetically) the creation of "the stars." Now, this cannot be viewed otherwise than as a reference to the creation of "the stars" by God; it cannot be taken to record in chronological order such an act of creation as that of the countless starry host, the supposition of whose origin at the same time as that of the earth, or at any one period, or in any limited time, involves an absurdity which cannot for an instant be received by any reasonable mind. And the principle which seems thus to result as regards "the stars," would hold equally good as regards the other acts of creation, also stated to have taken place within the "six days;" and we shall be obliged to admit that the fact of creation, and not its particular period or chronological order, is the thing intended to be announced.

Several arguments have already been advanced against the doctrine, that the successive acts of creation took place in the chronological order in which they are narrated; and to these may be added the consideration, that taking the narrative literally the earth is stated to have been covered with terrestrial vegetation before the sun was, according to the text, created.

The formula—"And God saw that it was good," is repeated after the announcement of each of the successive acts of creation, except as regards the earth; where the omission of these words furnishes an

additional reason for believing, that the announcement of the earth's creation refers to a distinct, an independent, and anterior creation.

It is very satisfactory to be enabled to bring in corroboration of the view proposed, " the sanction of Hebrew criticism," as afforded by the Regius Professor of Hebrew in the University of Oxford. Dr. Pusey, after observing, (in a note supplied by him to the Rev. Professor Buckland, and published at p. 24 of the Bridgewater Treatise) that the point upon which the first chapter of Genesis appears to him really to turn, is, whether the two first verses are merely a summary statement of what is related in detail in the rest of the chapter, and a sort of introduction to it, or whether they contain an account of an act of creation, continues :—"And this last seems to me to be their true interpretation; first, because there is no other account of the creation of the earth; secondly, the second verse describes the condition of the earth when so created, and thus prepares for the account of the work of the six days; but if they speak of any creation, it appears to me that this creation 'in the beginning' was previous to the six days, because the creation of each day is preceded by the declaration that God said, or willed, that such things should be, ('and God said') and therefore the very form of the narrative seems to imply that the creation of the first day began when these words are first used, i. e. with the creation of light in verse 3. The time then, of the creation, in verse 1, ap-

pears to me not to be defined; we are told only what alone we are concerned with, that all things were made by God." The learned Professor further remarks, that in some old editions of the English Bible, where there is no division into verses, we actually find a break at what is now the end of the second verse; and that in Luther's Bible (Wittenburg, 1557,) we have in addition the figure 1 placed against the *third* verse, as being the beginning of the account of the creation of the first day.

In reference to this point, I may refer to the well known fact, that the divisions of the Bible now in use, are quite a modern invention, the different books being originally without any such detached parts. With regard to the present mode of dividing the Bible into chapters and verses, I would beg that it may be borne in mind, that the division of the Bible into chapters and verses is of comparatively recent introduction; the division into chapters having been made by Cardinal Hugo, for facilitating references to the text, and the subdivision into verses (both in the early English translations and in the Hebrew itself,) being of still later date, the Hebrew Old Testament having been first divided into verses by Athias, a Jew of Amsterdam, in an edition published there in 1661. In the Porteusian Index to the Bible, the result is thus stated, viz. " that the present division of the Bible into chapter and verse is an invention, partly Jewish, and partly Christian; and that it was adopted for the sole purpose of reference,

and not made with a view to any natural division of the subject therein contained." All this, however, is well known, and I merely recal the remembrance of it, to remove any difficulty which might be felt, in putting out of sight considerations arising from the divisions which have been handed down to us with the sacred text.

It appears to me, that we have strong confirmatory reason for concluding that the system of Creation mentioned in the introductory portions of the book of Genesis, was announced, rather in reference to man, than to its character as a natural event; and consequently, that the only creation mentioned was the particular system over which the Lord made man to have dominion. If we were thus to conclude, the existence of the earth in periods anterior to that epoch in which it received the races of organic inhabitants detailed in the book of Genesis, would be sufficiently allowed; and we should be justified in concluding, that the several acts of Creation being mentioned there, by no means implies that they were the first; and this granted, *geological evidences*, at all events, would oppose no difficulty to the reception of the doctrine, that the Earth received the successive creations there described in six natural days.

That doctrine, it has been already stated, mainly rests on the repetition, between the announcement in Genesis of the successive acts of creation, of this formula, " And the evening and the morning were

the first day,"—" And the evening and the morning were the second day,"—and so on. And it has been suggested that these expressions may be interpreted as having regard to new creation; I would also suggest the consideration that the expression, " And the evening was, and the morning was," (marginal translation) may be equivalent to the statement that " years rolled on;" and that this figure of speech may indeed furnish an emphatic representation of the consistency, harmony, and appointed regularity which are indicated in the motions of the planets. May we not read, " And the evening was, and the morning was," i. e. went on, or returned regularly, or continued in their ordained course; and that in the third age or condition represented by the word " day," God said, " Let the earth bring forth grass," &c.; that in the fifth age, " God said, Let the waters bring forth abundantly the moving creature," &c.; and so on.

When, however, it is proposed to interpret the " days" of creation as being, or being separated by, great periods, it is not meant that such is necessarily the interpretation to be placed upon the word day in *all* cases of its occurrence in the first chapter; since we cannot consistently suppose a long interval to have elapsed after the creation of light without any further exercise of creative power, until " God made the firmament," and " divided the waters," &c. nor any imaginable continuance of that division of the waters from the waters without their " gathering

together" into " seas." But unless, as I have already observed, we admit the first verse to refer to a period of indefinite duration, sufficiently extended to be consistent with the testimonies of natural phenomena, and regard the narrative of successive creations given in Scripture as the history of that system only, to the dominion over which, man was newly called by his Creator, we must understand epochs of long duration to be contemplated by the next succeeding " days" of creation, and periods of equally undefined extent to separate the successive acts of creation thence described.

The result, then, of the considerations discussed in this chapter appears to be, that for the reconciliation of the sacred text with the evidences of Geology, two courses are open to our acceptance, in either of which the altered interpretation proposed can be recommended on philological and reasonable grounds, and by the adoption of either of which we may establish the desired reconciliation. The next chapter will, I trust, shew that an equally satisfactory result is arrived at with regard to the doctrine of the Flood.

Chapter VII.

The Conclusions of Geology considered with reference to the Scriptural Doctrine of the Noachian Flood.

Mankind have been accustomed to believe, (founding their belief upon the Mosaic text, in the absence of actual observation,) that no physical revolution affected our planet from its creation, until about sixteen hundred years after that event, and that its surface was then for the first time visited with a transient flood, which for the space of one hundred and fifty days prevailed over the whole earth, and covered its highest mountains, sweeping away all the inhabitants by which it was peopled, excepting a selected number of every living kind, who were spared to replenish the globe.

From such premises as these the doctrine results, that the Deluge thus described in the Book of Genesis was a supernatural event,—that the earth had not been visited by any revolution, from the Creation till the occurrence of the Flood—that it was a gradual and temporary inundation, simultaneous over the whole globe, effecting no change in the relative situations of land and sea, and destructive of its inhabitants only,—that the earth was therefore left, and that it now exists, in the state

and form in which it was originally finished and moulded by the Creator, and of course that all existing animals are of the same kinds and species as those which lived upon the antediluvian world, and are in fact the descendants of those which inhabited its primeval surface, no announcement being made of any new creation, or renewal of species having taken place since the Flood.

Until a correct system of induction was established—until in fact, the science of Geology had enabled us to trace in the authentic monuments of the globe itself, the only really faithful record of terrestrial events, the above mentioned too literal acceptation of the narrative contained in the Book of Genesis was absolutely received with implicit faith.

Accordingly, it was usual to consider every feature of the globe, and every accumulation of fossilized shells, and other organic remains, imbedded beneath its surface, as being the natural monuments of the single event thus described in the Scriptural record. And though the character of the phenomena thus observed, must have clearly proved to any careful observer, that such phenomena could not be attributed to the tranquil and the transient inundation described in the Mosaic text, or to any deluge, whatever might have been its force, yet this inconsistency seems to have been wholly overlooked.

But the test of scientific investigation, and the results of enlarged and generalized observations, had

no sooner been directed upon the subject, and a natural knowledge of the fossil remains of many successive and distinct creations, accordant with the varying conditions of the globe, had no sooner been achieved, than the conviction gained ground and acquired the force of established truth, that the earth had been the scene of many and great mutations and revolutions, both in its surface, in the relative situations of land and water, and in the forms of organic life inhabiting its successive periods.

Among the more obvious of the geological phenomena and resulting inferences which declared these facts, the following, as furnishing evidences the most satisfactory, are selected from those already noticed, and again connected in illustration of this portion of the argument.

First, The varied characters of the stratified formations, and the immense depth to which they extend through the crust of the globe.

Second, The alternation of strata of different kinds, they being in some cases the product of the long residence of the ocean, and in others, of fresh-water lakes and rivers; and strata filled with marine remains, occurring upon or between deposits of great thickness, stored with those of races belonging to the land.

Third, The production of one formation being, in some cases, due to a previously stratified rock having been broken up and redeposited in water.

Fourth, The vast proportion of Limestone in the structure of the globe, that rock unquestionably recording the long residence of the sea upon areas which now form the substrata of our continents. And the extensive formations of Chalk which supervene upon the remains of earlier formations, and are again succeeded by formations due to later alternations in land and sea.

Fifth, The Chalk formations owe their origin to causes connected with revolutions and catastrophes which occurred before the last physical revolution of our planet. Dry land and fresh water existed before the chalk strata were deposited; but the earth was different in those periods to what it was even after the chalk strata had been deposited and elevated, and still more different to its present condition, both as regards its aspect and its inhabitants.

Sixth, Deposits which contain certain tribes of organic remains, alternate with others that enclose no remains whatever, or the remains of quite different races; of races so different as to assign the strata in which their fossilized structures are discovered, to distinct conditions of the globe. And strata full of marine exuviæ, are separated by others full of trees swept down from the land.

Seventh, Beds of fossil shells and other marine accumulations, to a considerable thickness, which have doubtless formed an actual beach, have, in many instances, supervened by tranquil accumulation upon the remains of earlier transitions, and

these beds are found at depths beneath the existing surface.

Eighth, But it is in the changes that have affected organic life in the altering conditions of the globe, in the order of succession of animated beings, that the geologist is more particularly furnished with the evidences of terrestrial revolutions. He finds that the strata of the globe contain organic remains, varying in each distinct formation, and most of them differing essentially from those plants and animals which now inhabit the earth. That a distinct order of things in regard to terrestrial condition and organic life, is represented by one particular system of deposits. That a distinct creation appears to have more than once taken place. Thus the fossils of the Lias exhibit proofs of their having been the production of *a distinct creation*, while another great boundary line is marked by the Cretaceous formation. That the fossils occurring through the higher formations succeeding to the Lias, namely, the Oolite, the Greensand, the Chalk, and the Clay deposits, exhibit entirely new genera of animals, both of the Saurian and the Testaceous tribes. And that it is not until we reach the upper Clay formations, that we find the remains of terrestrial quadrupeds, and there, accordingly do we find the monuments of another distinct creation—of the creation of an order of animals, differing in almost every respect from those which had preceded them, and of which not a single bone is to be found in any of the preceding

formations, and most of the species of which animals had passed away before the creation of the present order of things. Of the organic fossils of the Lias, it is observed, that the most decided proofs of their belonging to a former world, and a distinct creation, are their presenting the relics of a tribe of enormous marine animals,—quadrupeds possessing the structure of a fish and a lizard—and which are confined to that extensive series. These vast changes in the forms of organic life, evidently corresponded with physical mutations of the surface, and while they afford evidence of several distinct creations, each adapted by creative Wisdom to a particular condition of the globe, they establish the frequency, as well as magnitude, of the physical revolutions by which they were produced.

Ninth, The proofs of great changes having taken place in the temperature and climate of the terrestrial surface, such changes having been influenced by those which have occurred in the relative proportions of land and water, must certainly contribute additional evidences of the occurrence of events, anterior to the transient inundation mentioned in the Mosaic narrative. Thus, the evidences of high temperature in the earth's atmosphere, are furnished in the secondary formations. A comparison of the strata composing the two great divisions, called the Secondary and Tertiary formations, affords indications throughout the space occupied by Europe, of a transition from the condition of an ocean, inter-

spersed with islands, to that of a large continent. And it is believed, that since the commencement of the Tertiary period, the land in the northern hemisphere has been increasing. To this cause we may probably attribute, in a great measure, that gradual diminution of temperature which the organized remains of the different periods denote. In the newest Tertiary deposits, and in those alone, we find an intermixture of species which are now existing with some of those which are wholly extinct. But the animals and plants of the more ancient strata, are not only such as could not now exist in the latitudes which they formerly inhabited, but almost all the species, and very many of the genera, are no longer to be found in any part of the known globe.

In these, and the many other phenomena already brought together in the third chapter, therefore, the geologist finds successive conditions of the globe, often dissimilar from each other, and separated by periods of indefinite duration, most distinctly announced; and by none of these phenomena more satisfactorily, than by the different character of organic life in different periods of the earth.

Considering all these, which are but selected from a multitude of other facts tending to the same result, we cannot but yield to a conviction of the frequency, as well as the magnitude, of the changes which such phenomena infallibly and unquestionably relate. They very plainly shew—first, that the Mosaic Deluge, that is to say, the comparatively

recent event which has been noticed by the sacred historian, was not the only event of the kind that ever affected the globe; and secondly, that an event such as that which is mentioned in Scripture, must have been wholly insufficient to produce any of the phenomena disclosed in the researches of Geology.

The latter conclusion is rendered still more satisfactory, by the consideration that it is in perfect harmony with the character which has been ascribed by Moses to the Noachian Deluge. For as the flood is there represented as an event which "exhibited no violent impetuosity, which neither displaced the soil or the vegetation which it supported," we ought not to expect to find in nature any "remaining marks" of such a catastrophe; but should rather, with the Rev. Dr. Fleming, "feel our respect for the authority of revelation heightened, when we see on the present surface no memorials of the event."* Professor Jameson also supports the opinion that the Deluge has left no trace of its occurrence.

The great Linnæus declared that he saw no examples in nature of the ravages of an universal flood; and it must be a source of satisfaction to the Christian philosopher, that after subsequent investigations he is enabled to agree in the opinion, that *the*

* Rev. Dr. Fleming, in Jameson's Philosophical Journal, No. 28, for April, 1826, p. 214.

Mosaic Deluge cannot be identified as to its period, effect, or character, with any of the geological deluges or convulsive revolutions of the globe; for a contrary conclusion would have rendered the Mosaic text inconsistent with the language of nature, upon a point in which the text is not susceptible of an altered construction. The alternative of placing on the letter of the text an altered construction, in harmony with its obvious meaning, has happily reconciled its declarations with those of Geology upon points in which the received interpretation was at fault. But on this particular point, the alternative referred to would not have availed, the language of the text not admitting of reconciliation with the infallible authority of geological truth, by the adoption of an altered interpretation.

Were the Mosaic Deluge to have been identified with any of the events whose memorials are discoverable in the globe—for instance, with any of those revolutions at the period of whose occurrence we know *that Man was not a tenant of the earth,* it would have been impossible to have reconciled the text with the declarations of nature as to the events in question, without doing violence to the whole context of the narrative, and the doctrine it conveyed.

The Mosaic account of the Noachian flood, has been doubted, in consequence of the total absence of any fossil remains of the human race; that is, fossils properly so called, and occurring in the regular strata

of the earth. The fact is unquestionable, that fossil remains of man have not been discovered.

It is certain that all the fossils which are found in the strata of the globe are attributable to those revolutions of its surface, which occurred in ages preceding not only the Deluge recorded in the book of Genesis, but the Creation of mankind. It is very unlikely that any actual fossils are attributable to the Noachian Deluge; certainly none of the regular stratified formations of the earth's crust are due to that event; and its character, as described in the Mosaic narrative, does not justify the assumption that it could have fossilized the animals it destroyed. Besides, fossilization is probably due to conditions which were peculiar to antecedent periods.

If fossils could be referred to the Deluge mentioned in Scripture, as well as to anterior events, the fact of their being found unaccompanied by any fossil remains of man, would certainly render it difficult to reconcile the Mosaic history with geological phenomena. But, as already stated, we cannot expect to find in the globe any records of that event; and as there are not any fossil remains, which were entombed and converted into their existing state by the Deluge, no argument against the veracity of the text can be sustained, on the ground of the absence of the fossil remains of man. On this point Mr. Parkinson, in his able "Introduction to the Study of Organic Remains," observes, that "no circumstances are stated in the Mosaic narrative, which will

authorize the supposition that this Deluge was accompanied by such subversive violence, as could bury its victims in those situations which would dispose to the mineralization of their remains."

So far then from the absence of fossil remains of the human race furnishing any reason to doubt the Mosaic narrative, that fact agrees with its testimony. And not only as corroborating the character there assigned to the Noachian Flood, but also as furnishing additional reason for the belief that man did not exist cotemporaneously with the animals whose fossil remains are discovered in the strata, or exist at the epoch of anterior revolutions; and consequently supporting the testimony of Scripture to his recent establishment upon the globe.

Baron Cuvier's observation on this point must be cited here. That illustrious naturalist, after stating many facts on this subject, in his "Discourse," proceeds (p. 85 of English translation)—"All these tend to confirm the assertion that the human race did not exist in the countries where fossil bones are found, at the epoch of the revolutions which buried those bones; for there cannot be assigned any reason why mankind should have escaped such overwhelming catastrophes, nor why human remains should not now be discovered, as well as those of other animals." . . . . "The establishment of man in the countries where we have said that the fossil remains of land animals are found, that is, in the greatest part of Europe, Asia, and America, is

necessarily posterior not only to the revolutions which have covered these bones, but even to those which have laid open the strata which envelope them, and which are the last that the globe has been subjected to; whence it is clear that we can neither draw from the bones themselves, nor from the more or less considerable masses of rock or earth which cover them, any argument in favour of the antiquity of the human species in these different countries."

But though we cannot, consistently with the plain meaning of the text, suppose that even the forms of the existing land are attributable to the Deluge there narrated, much less that the elevation of that land above the waters, and the replenishing it with organic fossils, are due to such an event, we may admit that some effects of a strictly superficial character might have been produced by diluvian torrents, as forces acting from above the surface. It is, however, very doubtful whether we are authorized by the Mosaic text, in assuming that any such prevailed at the epoch of the Noachian Flood. It is only necessary to observe the circumstances under which organic fossils occur, and the condition of the remains themselves, as well as their generic and specific characters, to perceive that they were slowly and gradually entombed, at periods widely separated from each other, and by events of a very different character to the Deluge; and that whatever could have been the abrading force of the diluvian waters, the fossil remains

cannot have been deposited in the situations where they are found, by that Deluge too. A knowledge of the actual phenomena of stratification, and of the evidences presented in the structure of the earth's crust, must enforce the conviction that it is physically impossible they can be attributed to the operation of the Deluge recorded in the sacred text. We cannot suppose them to have been so deposited by the Noachian Flood, or by any one deluge, without supposing also evident absurdities, namely, that all the materials of the rocks containing fossils, were put in a state of solution by the event, or in other words, that the materials of the earth's crust, to the depth of many miles, were reduced to a kind of paste, in which organic structures could be enclosed;—those organic structures too, being the remains of animals and plants, which *were not cotemporary* on the globe! For the organic remains which are imbedded to so amazing an extent throughout the stratified formations, must have come there either by means of such a solution, or by gradual accumulation upon the actual places inhabited by the plants and animals whose remains are found. But we are not left to speculate, or form suppositions, as to the means by which these phenomena have been produced, for the circumstances under which they occur, infallibly demonstrate a tranquil and gradual accumulation to have been the means by which these varied remains became enclosed; an accumulation which establishes

the long duration of the particular conditions or circumstances to which it was due. And the repetition of strata enclosing different classes and forms of organic life—different to each other, and often to those by which they were preceded and followed—whose accumulation is equally the result and memorial of indefinitely extended periods of time, evidences the repeated occurrence of a change which terminated one long existing condition, to be succeeded by another.

Assuming even, that the continents now above the ocean, have been traversed by the waters of a deluge since the period or periods when that ocean last retired from their surface, and attributing to those waters the greatest possible force, they could only have, in some respects, moulded those continents of dry land, contributed to hollow out those valleys, and level or round those eminences, in the recesses of which organic remains are found, and beneath which, exist that vast, and for the most part tranquilly accumulated, system of stratified deposits, which are the faithful historians of existence and destruction, in periods long antecedent to the Mosaic Flood.

To the agency of such a Deluge, however, as the one described in the Mosaic narrative, we really are precluded, by the terms of the narrative itself, from attributing any of the phenomena presented in geological researches. At the most it could only have accumulated some Alluvial strata, have en-

closed in them some existing animals, have detached some fragments from rocks, and deposited a slight stratum of such substances as the waters could have held in solution. And when we reflect that that Deluge was not universal over the globe, and that we have no good reason for believing that its waters traversed any but *a particular territory*, we must see the folly of looking in geological monuments for any of its effects. The argument is very satisfactorily strengthened by the familiar illustration which is derived from the facts, that one of the Egyptian pyramids is built with a nummulitic limestone—a formation almost wholly composed of fossil shells, that we have accounts of these pyramids among the earliest records of mankind, and the time and cause of their erection seem to have been unknown to even the Egyptian priests, only fifteen hundred years after the Flood mentioned in the book of Genesis. It may therefore "be conjectured" (says Dr. Goldsmith) "that they were erected but a short time after that event. The fossils here found cannot have had time to be formed into a part of the solid stone, either during the Deluge, or immediately after it, and consequently such formation into a part of that stone, was before that period." This argument is far from being the strongest of the reasonings which preclude our attributing any geological phenomena to diluvial action. But these are the kind of appearances which those persons who contend that all the changes of the globe, occurred in the com-

paratively brief period between the Creation, as described in the Mosaic narrative, and the Deluge, suppose to be attributable to the events of that period. The persons who hold that doctrine find themselves obliged, by the phenomena, of which this is but a single instance, to allow the occurrence of changes in the globe; but their jealous and timid theology dares only to admit the brief period in question for that occurrence.

As regards the limestone of the pyramids, however, the argument is strengthened by the very high probability of their antediluvian origin.

The illustrious Cuvier, in a less advanced period of geological induction than the present, stated it to be one of the best established conclusions in Geology, that "the countries which are now inhabited, and which were laid dry by the last revolution, had been formerly inhabited at a more remote era, if not by man, at least by land animals; that consequently, at least one previous revolution had submerged these countries; and that, judging from the different orders of animals, whose remains we here discern in the fossil state, such countries had probably then experienced two or three irruptions of the sea."

The theory that, at the Deluge, the land and sea changed place,—that what were existing continents of land before the Deluge, sank upon that event, below the waters, while that which was the bed of the ocean, and had since the creation been covered

by the ocean, simultaneously rose above its surface, and still continues to form all the land now existing above the waves, is a theory utterly and obviously inconsistent with actual facts—and is wholly incapable to account for the existence of terrestrial and marine remains beneath the surface of existing land, for the vast amount of animal and vegetable remains there enclosed, and for the general, the decisive, and unequivocal phenomena of stratification; that theory is not only incapable of accounting for these phenomena, but is flatly disproved by their unquestionable testimony. And it is astonishing therefore, that so extravagant a method of solution or reconciliation should have been proposed by persons who pretended to any knowledge of geological facts. It has, however, been not only proposed, but gravely urged. Its supporters appear, with the accustomed blindness of mistaken zeal, to have overlooked its total inconsistency with known and established facts, and also with the Mosaic text itself, for on this head the authority of Scripture is express, and its language is not susceptible of an altered construction.

The many revolutions, the changes of the relative situations of land and sea, to which geological phenomena bear testimony, are effects which the context of the Mosaic narrative does not ascribe to the Deluge there related, the power to produce. It must be borne in mind that it is narrated as an event

which left the relative situations of land and sea, or the general surface of the earth, in the same state as before its occurrence, except as to the inhabitants of that surface. That the Scriptural doctrine of the Deluge is one of gradual and transient inundation of the land, and of a destruction merely of organic forms having taken place. That the sacred historian describes the rivers of the antediluvian paradise, as being the rivers known at the time of composing the history. For he says, "a river went forth out of Eden, and from thence it was parted and became into four heads. The name of the first *is* Pison :— that *is* it which compasseth the whole land of Havilah," &c.* And the olive leaf plucked off by the dove of Noah, is a familiar, but tolerably decisive instance, for it must have been plucked from the antediluvian land, unless it grew in the incredibly short period of a few hours, on a territory just emerged from the sea! According to the Mosaic text, it also appears that the waters occupied one hundred and twenty years in their encroachment upon the land, formerly occupied by Noah and his cotemporary inhabitants on the globe; and that after one hundred and fifty days "the waters had retired from off the earth." All which points out that an existing continent was inundated, and then left dry, and not that it was buried beneath the ocean.

The great revolutions of the globe, to which the

* Genesis ii. 10, 11.

researches of Geology bear testimony, must evidently have been events anterior to the Deluge related in the book of Genesis. And there are many facts which support the conclusion, that the Noachian Deluge cannot be identified with any of the geological revolutions, which are recorded in the structure of the globe. Each of the changes, by irruptions of the sea, which visited its ancient surfaces, have occasioned the destruction of several species, and even genera of animals, not only those inhabiting the land, but also those inhabiting the sea. The changes which last affected the globe, appear to have been sudden and tumultuous;—no such occurrences are attributed to the Noachian Flood: and certainly a revolution which buried the then existing land, as supposed by the theory in question, cannot have been a flood of waters which inundated, and then "retired" from the earth.

But, at the same time that the researches of Geology, coinciding with the obvious construction of the Mosaic text, forbid our attributing any of the revolutions traced in its investigations, to the operation of the Flood described in the sacred text, and teach us that we must not expect to find in the earth one trace of its occurrence, it is to be borne in mind that there is not any conclusion resulting from the known phenomena of the globe, that contradicts, or is in any degree inconsistent with the testimony of the Mosaic Narrative, to the occurrence of the Flood there described, or that denies that it took

place at a period as recent as that assigned by the chronology placed on the Mosaic text. In fact, there is no reason to conclude that of the repeated irruptions and retreats of the sea, one may not have occurred at a period as recent as that assigned by the Mosaic text. Indeed, proofs are derivable from a careful investigation of what has taken place on the land, hitherto subjected to geological investigation, since the last great geological revolution affected its surface, that "the human race has only resumed a progressive state of improvement, and formed established societies, at an epoch which cannot be dated much further back than five or six thousand years. This is a result," says Baron Cuvier, "the more valuable, as it connects natural and civil history together in one uninterrupted series."

There is one point, however, upon which some phenomena in nature, though not in Geology, render it necessary that we should alter our construction of this part of the Mosaic text; namely, as regards the universality over the globe, at the same period, of the diluvian waters there described; in other words, the geographical universality of the Deluge. This is an alteration which may be made by changing the interpretation placed upon a particular expression only—an expression, as to which the received interpretation is very evidently at fault.

Whether an inundation, the very occurrence of which is made known by Scripture only, and is attested by the verities of Scripture alone, and

which is there described as unattended by any of those features of convulsive force, that could have impressed the record of such an inundation on the globe, was, or was not, at the same time universal over its whole surface, is on these accounts, a question which the researches of *Geology* seem unlikely ever to decide. There are not any conclusions established in *this science* which require that the universality of the Flood should be questioned at all. Its universality only becomes a question, from the inevitable pressure of considerations which are not suggested by geological research, or by the professors of that science.

Among those considerations are the following:—

First, If the Deluge had been universal, and had one family of eight persons been the only members of the human race saved from destruction by its waters, to become the secondary progenitors of all human kind, should we find the characteristic differences between the Mongolian and Caucasian races—differences so great, says the illustrious Cuvier, that one is almost tempted to suspect that their ancestors and ours had escaped from the last great catastrophe, at two different sides; should we find any ground for the similar opinion, which is more confidently expressed by that great naturalist, with regard to the negro races, "all whose characters," he observes, "clearly shew that they escaped from the great catastrophe, by some other point than the Caucasian and Altaic races, from whom they were

probably separated long before this catastrophe happened." And again, with regard to the strange race of people to the east and north, beyond the vast deserts of Tartary, as to whom Baron Cuvier observes, "their yellow complexion, projecting cheek-bones, their narrow and oblique eyes, and scanty beard, render them so different from us, that we are tempted to believe their ancestors and ours escaped at the great catastrophe, by different sides?"

Second, Had the diluvian waters been universal over the globe they must have drowned all land animals. Yet many animals of different kinds which certainly inhabited its surface for ages preceding the occurrence of the last inundation of waters, still live and flourish in the same countries where the remains of their progenitors lie interred, which, having regard to their specific adaptation, to the limits of geographical distribution, we must see that they certainly could not do, if any diluvian waters had swept the land on which these different animals exist. This argument does not apply to the complete annihilation, throughout all their species, of several genera, such as the Mastodon, the Megatherium, the Palæotherium, the Anoplotherium, &c. "the mighty animals which once ranged the earth," and are now extinct, for their extinction was of a far earlier date than Noachian flood. The present argument regards those animals which not only existed on the ancient globe, but also still exist, and which must have been destroyed, had the flood

been universal. We cannot admit the hypothesis of a special preservation and re-establishment of these animals; a re-peopling of the earth by a new creation of the same races of land animals, is not announced in Scripture.

It is well known that some very serious difficulties are opposed to the commonly accepted doctrine of the preservation of pairs of all existing species within the Ark, and of the derivation of existing kinds and species from the antediluvian progenitors thus preserved. The stubborn nature of facts and the infallible certainty of scientific reasoning, here again, interfere most unacceptably with the cherished conceits of human interpretation. The extended meaning unnecessarily attached to the terms of universality employed in the sacred text, has led to a belief which is utterly inconsistent with known and established facts. We know that certain plants and animals are characteristic of particular geographical districts. That the *fauna* and the *flora* of the equator have only an equatorial range, that the plants and animals of the polar regions are equally unfitted to the circumstances of tropical existence, and that these geographical limits are in fact such that seven distinct divisions are, by competent authority, said to be marked in the distribution of animals, and forty-five distinct areas of geographical limits have been ascertained in the vegetable kingdom. Man alone possesses a universal geographical range, and the plants and

animals which are cotemporary with his race, are generally unfitted to endure any interchange in geographical distribution. Notwithstanding all these opposing facts, the received interpretation supposes pairs of *all* the animals existing on the globe at the period of the deluge, to have been miraculously congregated in one spot, to have continued there for a considerable period, and after the Flood to have diverged from thence, and become re-established in their respective countries and divisions of the earth—an hypothesis as extravagant and as unnatural as that which teaches that, notwithstanding specific adaptations to climate, they were originally congregated on one spot at the creation, and afterwards gradually became distributed over the globe.

Besides this, the doctrine proposed by the received interpretation is contradicted by the impossibility of there having been any means of transport from their several and distant localities to the country occupied by Noah, for the purpose of their collection in the ark; and when arrived there, by the still more obvious impossibility of pairs of all existing kinds and species of animals having been congregated within the limits of the ark, be those limits extended to the widest dimensions allowed by the measurements laid down in the sacred text. When we reflect that no less than one thousand species of mammalian animals are ascertained, that of birds five thousand species are known, and that of land reptiles, two thousand

species are enumerated, it must be clear that pairs of *all* cannot have been congregated in the ark. Besides, of the insect tribe, not less than one hundred thousand species are distinctly enumerated; pairs of all these must be added; and then, no means of preservation would be afforded for the thousands of species of fish, and the millions of smaller animals which must be comprehended under the terms of the Mosaic text, since even the finny tribes could not have existed in such altered conditions of the sea, as those which are involved in the doctrine of the universal Flood.

Again, very considerable difficulties arise from considerations regarding the means of provision in the Ark, for pairs of "all-created things," during the period of nearly a year. Independently of the uncongenial habits and appetites of the different orders in the animal kingdom, of the difficulty of supposing the lion and the tiger, and other carnivorous races, to have formed inmates of "Noah's ark," It is difficult to see how adequate provisions, of so many different kinds, can have been stored up for the sustenance of this vast living freight of progenitors of all existing races. And moreover, if all the vegetation that had clothed the land, had been (as it evidently must have been) destroyed by the waters of such a universal flood as that in question, what provisions were there for the herbivorous races, thus preserved, to eat, on their descending from the ark? It seems clear that before

any vegetation could have arisen for their sustenance, the object of their previously accomplished preservation was likely to be defeated by the operation of a very familiar agent. We must bear in mind also, that a new creation in this exigency, by the immediate interposition of Divine Power, is nowhere announced in the sacred narrative, and that in the absence of any such announcement, it behoves the Christian philosopher to pause in humility, before he calls in the aid of miraculous interposition to overcome or explain away the difficulties which result from building favorite doctrines and hypotheses, upon the accommodated and condescending language, in which it has pleased Divine wisdom that the announcements of revelation should be conveyed. The impiety of supposing, in order to sustain the accepted doctrine of the Deluge, that miracles unnumbered, and stupendous beyond any of those which were wrought in defence of the Christian dispensation, were resorted to, has been recently most admirably and satisfactorily illustrated and urged by the Rev. Dr. Pye Smith, and I therefore must forbear to press this point further, or do more than refer to his arguments, as stated in the "Relation of Scripture and Geology explained." I consider the point here suggested, as to provision for herbivorous races, to carry with it considerable force against the accepted doctrine.

The consideration too, presses with inevitable

force, that the collection of living animals in the ark, cannot have been in order to the preservation of their kinds and species, since the Creator, in His Wisdom, cannot be supposed to have entrusted the preservation of His creatures to the method suggested in the Mosaic text. To suppose so, is impiously to attribute to the Creator a doubt of His own Power, and to represent the Deity as resorting to secondary, to artificial, nay to positively insufficient means, for accomplishing that perpetuation of His creatures, which could have been accomplished by means so much more worthy of and consistent with His Power.

To what result, then, can these considerations tend, but that pairs of *all* living species were not, for the purpose of their preservation, collected in the ark. Nor do the terms of universality employed in the sacred text, necessarily affirm any such collection.

"The expressions of universality with regard to the Deluge," says the Rev. Dr. Pye Smith, "are these—'the waters prevailed exceedingly upon the earth, and all the high hills that were under the whole heaven were covered.' To those who have studied the phraseology of Scripture, there is no rule of interpretation more certain than this, that *universal terms* are often used to signify only a *very large* amount in number or quantity." Various instances in support of this proposition, and among

others, those presented at the passages referred to in the note,* are cited by Dr. Smith, and he then proceeds: "Passages are numerous, in which the phrase 'all the earth' signifies only the country of Palestine.† In a few places it denotes the Chaldean empire;‡ in one, that of Alexander.§ From these instances of the Scriptural idiom in the application of phraseology, similar to the narrative concerning the flood, I humbly think that those terms do not oblige us to understand a literal universality; so that we are exonerated from some otherwise insuperable difficulties in Natural History and Geology. If so much of the earth was overflowed as was occupied by the human race, both the physical and moral ends of that awful visitation were answered." pp. 304—308.

Third, The doctrine of the universality of the flood, is utterly inconsistent with all known laws of nature. We certainly cannot conceive the possibility of a flood of waters having been brought upon the earth which could cover "all the high hills under the whole heaven," without at the same time admitting an addition of eleven or twelve miles

* Exod. x. 6, 15; Exod. xxxii. 3; Deut. ii. 25; Eccl. i. 13; Deut. xxxviii. 63, 64; 1 Chron. xiv. 17; and 1 Kings x. 24.

† Deut. xxxiv. 1; Isaiah vii. 24; Jer. i. 11; iv. 20; viii. 16; xii. 12; Zeph. i. 18; iii. 19; Zech. xiv. 10.

‡ Jer. li. 7, 25, 49.

§ Daniel ii. 39.

to the diameter of the earth, and an immense addition to its absolute weight; without admitting the consequent derangement of its motions as a planet, and of all its unseen and multiplied relations to the other planetary bodies of the solar system, a derangement the occurrence of which it is the height of impiety and presumption, even to suppose. We therefore cannot admit such an hypothesis, without calling to our aid the supposition, that for the destruction, by a particular method, of a few sinful inhabitants of the earth, God performed a miracle more stupendous than any recorded miracle wrought by His power, a miracle wholly gratuitous and unnecessary, and the performance of which must have shook the planetary system to its remotest and most distant range. We cannot admit the physical possibility of such a simultaneous depression of the whole dry land at one time existing above the waves, as could produce any such Deluge. Nor can we conceive the possibility of its re-elevation above the sea, after the brief period referred to in the Mosaic narrative. We cannot suppose that even a single continent, much less the whole dry land at one time above the sea, could by one and the same agency have been submerged, and then in a short time afterwards re-elevated. A simultaneous rise of five miles in the level of the sea, is a natural impossibility, no rise of the waters of the ocean could be produced, but by the elevation of the whole

marine bed, or by the sudden depression of all the dry land until submerged, and then it is calculated that a rise in the marine level of only two hundred and fifty feet would take place. The fall of the whole fluid that the atmosphere could contain is equally insufficient, for it would only extend to a depth of seven inches. And it is a fact, that no less than eight times the absolute quantity contained in all the seas and oceans together, would be required to produce such an effect as the submerging mountains of such immense altitude as those of the Himalayan chain. But, that a considerable territory may have been inundated, is a proposition to which we have no difficulty in assenting. We know that the bursting of a great inland lake or sea, would overwhelm for a considerable time a neighbouring territory. Or the great volcanic agencies which we still find in active operation, and which have permanently raised whole coasts and territories, and depressed others far beneath the waves, may have produced great local effects; but these agencies are totally insufficient to support a universal deluge, at one time upon the earth and its high mountains. If ever the ocean completely prevailed upon and enveloped the globe, it was before the agencies of central fire had raised its mountain masses, and indeed before that remote and mysterious period of primeval time, when "the waters were gathered together into one place," and the dry land appeared. Such

may have been the condition of the earth before the commencement of the first of "the days" of Creation; when in order to the gathering together of the waters, some great convulsion must have transpired.

Fourth, It has been already shewn that the changes which have occurred on the earth's surface, have not been produced by one event, or at one time. Many of the changes which the theory I have mentioned ascribes to the Deluge, probably occurred during the periods of indeterminate duration, which are thought to have elapsed before, or during, the "six days" of Creation. Many others have been the results of successive deluges, changes, and revolutions, and cannot be referred to one era. And the many phenomena of similar kind, and attributable to diluvian action, which are found in different parts of the globe, are satisfactorily referred to local causes and not a general event. Thus the newest drift has not been deposited by transient waters; and the continuance of the drift beds of the Silurian system in their ancient state, which could not be the case had diluvian waters overspread this country, is a further argument in support of the same general result.

Fifth, In Africa and in the Southern parts of North America, trees of magnificent growth are yet flourishing, which we know by certain evidence to have been standing before the Deluge, even carrying back the period of that event to the remotest era

assigned by learned chronologists. This fact seems to be of itself a sufficient argument against the assumed universality of the Noachian flood, for those trees must have been destroyed, had they been covered for nine or ten months with sea water.

Sixth, The existence of vast quantities of light and loose volcanic products, on the cones of some volcanoes that probably ceased to burn before the era of the Deluge, and which products, at all events were deposited before that era, also tends to negative the assumption of geographical universality for the Deluge.

Let us then consider whether the doctrine of the universality of the Mosaic flood, is not one arising solely from our construction of the text; and if it can be shewn that for sufficient reasons our construction may be made conformable to the language of nature, without in the slightest degree affecting the veracity of the sacred record, we ought to feel no hesitation in abandoning its generally received interpretation. In addition to the reasons mentioned at p. 195 *ante*, we have reason to believe that the expression in the Mosaic narrative, " the whole earth" was not intended to bear the extensive meaning which has been attached to it. For in that early period of human society, the geographical knowledge of mankind was probably limited by their senses, or actual experience. In comparatively modern periods, the globe was thought to consist

of one continent bounded by the ocean; and it is difficult to see upon what ground we can attribute a greater or more correct amount of geographical knowledge to the age when the Mosaic history was composed. We are perfectly justified in concluding that the particular continent occupied by Noah and his cotemporary inhabitants on the earth, and beyond which, probably, mankind had not at the period in question far, if at all, spread, was considered to constitute "the earth." The territory referred to was, perhaps, the whole of the terrestrial surface then inhabited. And, when we reflect that the Deluge mentioned in Scripture, had for its object the destruction of the human race, "then in all probability," says Mr. Lyell, "confined to a limited space," we naturally inquire, may not the inhabited parts alone have been submerged by that Deluge? And we have seen that several reasons would support the conclusion that the deluged earth was a particular locality.

It must, however, be acknowledged, that a difficulty does seem to attach to this hypothesis, inasmuch as the gradual rise of the waters must have afforded to the objects of the punishment, an ample opportunity for escape to a territory to which the visitation did not extend, and we must remember the reasonings which have been adduced by no less an authority than the illustrious Cuvier, in illustration of the actual occurrence of such an escape, I mean the facts first above mentioned

as opposing the geographical universality of the Deluge. The same explaining principle, however, applies.

It is a most extravagant proposition that *human traditions*, even though perpetuated in the sacred volume, are to direct our views as to the physical mutations of the globe, in periods long antecedent to the existence of any traditions, *or even of the human race.* But notwithstanding this inconsistency the learned work of the Rev. Mr. Harcourt, already referred to, is chiefly devoted to the investigation of the mythological systems of the most ancient nations, of whom any memorials have been handed down, and to that of the traditions and traditional observances which have been, or are yet, extant among their posterity, on any part of the globe, this investigation having been undertaken with a view of deducing from all of them, arguments in corroboration of the literal interpretation placed on the passages in question. But how can a corroboration derived from any such sources countervail, or even in the least degree weigh against the clear language of nature? The existence of the traditions may, it is said, be taken to evidence the foundation in fact, of the event to which they refer—an event which different nations have invested with features very different from each other. The concurrence of the traditions cannot prove anything more, if those among whom they are yet extant, emanated from a common stock, or modelled their belief on the

authority of those traditions, upon which the Mosaic account was probably itself based.

It really is astonishing that any competent reasoner can think of founding any argument upon such premises,—and it is to be seriously doubted whether the traditions and the idolatrous commemorations of various nations, in regard to what is assumed to have been the Noachian Deluge, really prove anything,—for it is to be borne in mind, that they are not monuments bearing a date subsequent to the event, but merely anterior to the Scriptural history, which latter may therefore have furnished the common source whence those observances were derived. It is not clear but that an argument founded on these traditional observances, adds as little corroboration to the actual fact of the Deluge, as an argument based on the similar commemorations of a nation, among whom the Mosaic History had been by common consent adopted and received.

"It is remarkable," says the Rev. Dr. Smith, "that learned writers have not perceived the absence of any logical connexion between the universality of historical tradition, and a geographical universality of the Deluge itself." Relation of Geology and Scripture, p. 205.

For these reasons, the traditions yet extant fail to adduce the support of any testimony, either to the universality of the Noachian Flood upon the globe at any one time, or to the doctrine that

it was the only event of the kind which ever happened.

Indeed it was hardly possible that any traditions should have existed, or should now exist, of any deluges, or any geological changes previous to the last event. And when we consider its nature, its remote distance not only from our own period, but from that in which the Mosaic narrative was composed, and give due regard to the mutations and the additions which an orally communicated tradition, transmitted through periods of so great extent, must necessarily have undergone, we cannot wonder that the Noachian Flood should have been, and still be among some uncivilized nations, clothed with the features by which it is distinguished.

The doctrine therefore that the language of the globe is now to be countervailed by any such uncertain and questionable testimony, is really too absurd to be met by serious argument.

It may perhaps be alleged by some persons, that because a narrative of the Deluge is perpetuated in writing, and its character circumstantially detailed there, the objections above referred to do not attach. But such objections cannot be avoided, unless on the ground that the narrative is matter of testimony, deriving its authority from the credibility of the writer, which is the only ground upon which the allegation I am anticipating could have any force. And certainly no such authority can be attached to the narrative, if the usual tests of human testimony be

applied to it; for the subjects of the Creation and the Deluge were those of which, from their remote character, the writer of the narrative could have had no personal knowledge. The Deluge he records, occurred nearly two thousand five hundred years before the composition of the Mosaic narrative. In any matter of testimony we inquire the means of information possessed by the witness, and also weigh the probability of the event he narrates—and "the more remote the subject of testimony is from our own knowledge and experience, the stronger ought the evidence to be to warrant our assent." But in this case we find narrated as positive facts, events of that peculiar and remote character, which was the most likely to invest them with imaginative features,—events which are in fact, the subject of the most extravagant and various fables in all other ancient writings in which they are at all mentioned, and events of which Moses himself had, of course, no personal knowledge. We find a character thus attributed to them, which is not corroborated by the actual language of the globe, nor even supported (though such support would add to it no force,) by other ancient histories. The Mosaic doctrine of the Deluge was not the only doctrine of the event which existed, even in his own time. A very different one was taught by the ancient Egyptians, a people who had successfully cultivated the fertile sources of natural philosophy. And we have seen that the testimony of nations who claim great antiquity,

being in many cases modelled on the Mosaic records, or borrowed from the book of Genesis, can add no corroboration to the features in question.

If, therefore, we admit that the universal terms employed are not to be understood in a literal sense, it will follow that the only point with reference to the doctrine of the Deluge, upon which the researches of Geology have established facts, left unnoticed in the Mosaic text, is that those researches have established the occurrence of events of which the Mosaic narrative, though professing to relate the ancient history of the globe, is wholly silent. In an earlier part of this essay, some reasons have been suggested for considering that periods of indeterminate duration are comprehended in the expression "the beginning," if not also in the six "days" of creation; and if this conclusion be established, we might be warranted in attributing the changes which the earth is proved to have undergone, to those periods. —At all events, there is no passage or expression in that narrative which interferes with the conclusions of Geology as to those anterior periods. It would follow then from the above consideration, that the language of the globe and the sacred record are perfectly reconcilable, and that it is only the silence of Scripture on the subject of events, other than the Deluge, that has to be explained, and that a sufficient explanation of that silence is furnished in the immediate design and general character of the sacred narrative. And the objections advanced apply only to its extraneous features.

Chapter VIII.

General summary of the considerations which form the subject of the three last preceding chapters; and of the reasons which have been held by able commentators for admitting the consistency of the results established in Geology with the doctrines of Revelation.

These seem to be as follows:—

That upon certain points, with regard both to the doctrine of the Creation and of the Deluge, the generally received interpretation of the Mosaic text can no longer be entertained consistently with the facts established in Geology, and must therefore be abandoned, but that it is susceptible of altered interpretation, and that for many considerations, it is clearly liable to correction, by the ascertained results of scientific investigations in the actual phenomena of the globe.

That such correction does not in the least involve the authority of the Holy Scriptures, because a construction which renders the Mosaic narrative perfectly consistent with the language of the globe, may fairly, and without doing violence to the meaning and context of the narrative, be adopted: or if any hesitation should be felt in receiving an altered interpretation, then there are strong reasons for con-

cluding that upon these particular subjects, the history interwoven in the book of Genesis, is not possessed of that character "which could give importance to every point of discrepancy or coincidence between its statements and the phenomena of nature."

That we may so conclude without casting the slightest impeachment on the sacred writings.

That with regard to the extent to which the received interpretation must be altered, we find,—

First, As to the doctrine of the Creation.

That the researches of Geology confirm the testimony of Scripture to the fact, that all created things originated in the fiat of Omnipotence; that the creation of man was last in order in the great work, the human race having become tenants of the globe at a comparatively recent period; and established societies having began to be formed, at an epoch no further distant, in all probability, than that assigned by the Mosaic text.

That consequently, it is only as to the periods comprehended by the expression "the beginning," and by the "days" of creation, that the received interpretation has to be adapted to the testimony of the globe. And that the only point therefore requiring reconciliation is one on which the inconsistency can be obviated by a change of construction, a change which is fairly warranted by the text.

Second, As to the doctrine of the Deluge.

That although the phenomena of the globe in-

fallibly testify that frequent changes in the relative situations of land and sea have taken place, and that the submersion by the waters, of land previously existing above their surface, has been for periods of lengthened duration, and that these changes have been accompanied by circumstances relating to organic life, which prove their occurrence at distinct intervals of time; yet, that these facts do not disprove the occurrence of the tranquil inundation described in the Mosaic narrative, because, on a comparison of their respective characters,—indicated as regards the geological deluges by the phenomena of nature, and as regards the Noachian Deluge by the statements of the Mosaic record,—the events cannot be identified with each other in any respect.

That the very character assigned to the Noachian Flood by the sacred historian, precludes us from expecting to find in nature any marks of its occurrence; our belief in it, therefore, rests upon the Mosaic record, as fully and independently as our conviction of the revolutions to which the globe has been subjected, rests upon the phenomena disclosed in geological investigations.

That such anterior revolutions occurred in periods of which nothing could have been known to mankind, but by means of geological induction; and consequently, that the silence of the Mosaic narrative as to their occurrence, is not surprising; and besides, such events were foreign to the subject of

those sacred records, which were destined to reveal the moral obligations of the human race.

That there are strong reasons for considering the introductory portion of the Mosaic text to admit of the construction, that great anterior periods, subsequent to the original creation of the world, are left undefined, unnoticed, and unlimited by the text.

That consequently, the proofs adduced in Geology, that the Noachian Flood was not the only event of the kind that ever affected the globe, do not impeach the veracity of the Mosaic text.

That the assumed universality of the Noachian Flood is not disproved by conclusions established in Geology alone; but that considerations arising on the text itself, on the laws of nature, and on physical facts, must forbid our adhering to that interpretation of it, which involves the doctrine of the universality of the Flood at one time over the globe, and in fact justify our interpreting the statement that the Flood covered the whole earth, to mean the whole earth then known to man.

Chapter IX.

The nature and tendency of Geological researches considered in their relations to other branches of Science.

The sciences of Zoology, Botany, and Chemistry, acquaint us with the animal and vegetable structures, and with the inorganic substances which belong to the globe; the science of Geography treats of the terrestrial surface as it now exists; and other departments of physical science acquaint us with the constitution of the atmosphere, and of the ocean, and explain the varied phenomena presented in existing nature. But "Geology," says Professor Phillips, "inquires further, whether the mechanical, chemical, and vital phenomena formerly exhibited on the earth, can be compared with those now occurring;—whether the mineral products which existed at a period so long passed away, were identical in kind with those of the present system; whether the plants and animals of both periods were of similar structure; and whether the general conditions to which these were related, exerted upon them the same influence, as the present conditions exert upon the existing system of life." Again, the sublime science of Astronomy declares

that innumerable systems, probably similar to that solar system of which our planet forms a part, exist throughout the universe, to an extent, of which an imperfect appreciation only could yet have been obtained, if, borne upon a comet, we could have traversed the "vast profound" ever since the creation of the human race,—while the science of Geology, whose researches are confined to *one* of those innumerable worlds, equally tends to heighten our reverence for the great Author of nature, by displaying the evidences of His beneficence and creative Power, as uniformly exhibited in that world, and in the successive systems of nature which have occupied its earlier surface. While the Creator's power is by astronomical researches so nobly illustrated in the realms of space, His wisdom and beneficence are exhibited by the sciences of comparative anatomy, of zoology, and botany, in the minutest, as well as in the most gigantic varieties of animated nature upon our globe. But it is the science of Geology that is privileged to confirm these evidences, by the venerable sanction of testimonies derived from the fossil remains of animals and plants, which inhabited its surface in periods of a mysteriously remote antiquity; and to demonstrate that He must be indeed eternal, whose being, whose perfections, and whose government are thus satisfactorily exhibited in the animated systems of periods, separated from each other by the lapse of thousands, if not millions, of

years. Again, while history improves our knowledge of human nature, by enabling us to compare society in different states and periods, it is the privilege of geological research to acquaint us with events which affected our planet, before the existence of any human records, and with the nature, the duration, the character, and the succession of its inhabitants, from the earliest dawn of animated existence. In the study of human history we are enabled to trace the rise, the dominion, and the extinction of ancient empires, and to contemplate the characters who took a part in the events of the ages to which we direct our research. But in the study of Geology, we are enabled to trace the very beginning of life upon our globe, to restore for contemplation the varied creatures which have successively inhabited its ancient surface, and to derive from them a most interesting and unexpected history, not only of their own dominion upon the earth, but of its varying conditions from the earliest times. And the interest which is associated with the study of historical antiquity, results in a far stronger degree from the researches of Geology, which are said "to collect and decipher what may be considered as the monuments and medals of the remoter eras of our globe." It may indeed be truly said, in the language of an eminent author, that "if we look with wonder upon the stupendous monuments of human skill—beautiful even in the decay of twenty centuries—and regard them

as testimonies of the genius of artists, and the riches of nations now passed away; with how much deeper feelings of admiration and astonishment must we consider those grand monuments of nature, which record the revolutions of the globe; where continents broken into islands; one land produced; another destroyed; the former bed of the ocean become a fertile surface; whole races of animals become extinct; and the bones of one class covered with the remains of another, or reposing upon the rocky tomb of an earlier animated world; and new generations arising in a system of life and beauty from previous chaos and death;" are the exciting and splendid phenomena which claim our wonder, and invite our inquiry.

But without seeking to enforce the fascinations and the advantages of geological research, by a comparison with the results of other branches of scientific inquiry, we may turn to the magnificent and exalting views which the peculiar investigations of Geology are privileged to open to our contemplation. And here indeed we are introduced to scenes of such variety, novelty, and wonder, and to results of such highly theological, and therefore practical importance, that Geology may be said to supply not only one of the most interesting objects of inquiry, but the very link which was previously wanting "in the chain of arguments adduced from the exterior of the earth, in proof of the being, the wisdom, and the goodness of an eternal Creator."

The terrestrial fabric, the history and constitution of which it is the province of Geology to disclose, is a scene of inexhaustible variety, which in its external features, must excite our wondering inquiry, in its distribution of surface must claim our constant admiration and gratitude, and in its mineralogical phenomena and structure must furnish objects of most curious and important investigation, associated as they are with the welfare and prosperity, as well as the actual condition, of man.

The mountains and valleys, the seas, the rivers and the lakes, the plains, and other features which diversify the surface of the globe, but more particularly the varied strata which, "like a pile of chronicles," are accumulated beneath that surface, are now understood as the monuments of terrestrial events, and are in truth the eloquent and only infallible historians of its distant periods and conditions. By their investigation, elucidated by the organic remains with which they are stored—remains that are as diamonds, flashing light into the gloom of primeval time — the geologist becomes acquainted with very startling facts.—He finds that our present continents and mountain ranges have, in ancient periods, more than once formed the ocean's bed, while on surfaces once dry land, and peopled by terrestrial inhabitants, the sea has subsequently flowed, and accumulated its characteristic deposits; and that on these ruins of earlier nature, fresh strata have arisen, to become in their turn the suitable resi-

dence of other systems of organic life.* The geologist further finds that our planet having, at remote periods, been the theatre of extensive changes, both in its own structure, and in the structure of its inhabitants, has been the habitation of animals, fishes, and reptiles, of which no living species are beheld by man; and which were in fact widely different from those that now accompany him upon its surface. And an investigation of the peculiarities of their anatomical structure, and of the circumstances under which they are imbedded in the strata of the globe, has enabled him to ascertain the nature of those changes, and the character of the terrestrial surface when they occurred, and to trace their effect upon animal and vegetable life. And these investigations are crowned by a yet more exalted result; for the geologist is thus enabled to trace throughout existing nature, the designed results of the great natural operations which have affected the globe,—to perceive that the turbulence of change was itself the result of agencies, the exertion of which has ever been governed by the greatest harmony of design; and that the present obvious adaptation of nature to the wants and the constitution of man, is thus "directly connected with the events of immea-

* He finds (in the language of Dr. Beattie) that,

> Art, empire, earth itself—to change are doomed;
> Earthquakes have raised to Heaven the humble vale,
> And gulfs the mountain's mighty mass entomb'd,
> And where the ocean rolls, wide continents have bloomed.

surably distant antiquity."—And "the present distribution of mankind," it is observed by Mr. Lyell, "appears in many cases to have resulted from operations, effected by lands and ancient forests, which have now disappeared, by seas which have been since filled up, by rivers which can no longer be traced, and by plants belonging to species which have long passed away from the terrestrial surface." By geological researches the student of nature is brought into actual contact with animals, the fact of whose existence and destruction, in former ages, upon the planet to whose surface he has succeeded, would otherwise have been totally unsuspected and unknown. The geologist enjoys the privilege of constructing as it were, by human science, a system of animated nature, different to any known in existing creation. The fables of ancient mythology invested nature with the creations of fancy; but the investigations of geologists have announced periods, whose existence and duration must otherwise have remained for ever unknown to man, and have then peopled them as fully with the creations of science, for such are to mankind the primeval inhabitants of the globe. They are long-silent and venerable historians, who, in the garb of other days, "teach us in the language of our own;" and their restoration at this immense distance of time, in their primeval and actual character, is in itself the most interesting result that could have rewarded the investigations of Geology, or have added a new triumph to the acquisitions of human science.

It is in the fossil structures which are heaped around and beneath us in every direction, that we find the great master-key to unlock the secret history of the earth. They are "as documents which contain the evidences of revolutions long antecedent to the creation of the human race, and they tell of many successive generations, of which the creation and extinction would have been equally unknown to us, but for the recent discoveries in the science of Geology." And the study of organic remains is indeed truly said to furnish a connecting link between terrestrial conditions and states of life, separated by incalculable periods of time. It embraces at the one end, the earliest dawn of life upon the globe, and a state of terrestrial condition, and of animated nature unlike the present, while at the other, it communicates its results to the gradually increasing storehouse of modern science; and in this study "we are brought," says the Rev. Professor Buckland, "into as immediate contact with the events of immeasurably distant antiquity, as with the affairs of yesterday."

Among the important inferences at which we arrive from the examination of fossil organic structures, the leading and most interesting conclusions are the following; which are thus stated by Dr. Mantell, in his recent work, "The Wonders of Geology."

First, That the extinction of certain forms of animated existence is a law which is not only in operation at the present moment, but has extended

throughout the period comprised in our present researches, and we trace its influence from the partial extirpation of certain existing species, to the entire annihilation of species and genera that once were cotemporary with man, as well as to those which are known to have lived and become extinct long prior to the existence of our race.

Second, that while, in the modern marine and fluviatile accumulations, the remains of existing species of animals, and of man and his works are entombed; in the ancient deposits of water-worn materials, those of large mammalia alone, and those chiefly of extinct kinds, are imbedded.

Third, That these animal remains principally belong to extinct pachydermata, related to the elephant, hippopotamus, and sloth, with horses, deer, and other ruminants, and that these had for their cotemporaries, bears, hyænas, tigers, and other carnivora, belonging to extinct species.

Fourth, That there was therefore a period immediately preceding the existence of man, when the earth teemed with large herbivorous animals, which roamed through the primeval forests unmolested, save by beasts of prey. Numerous species and entire genera have been swept away from the face of the earth,—some by sudden revolutions, others by a gradual extinction,—while many have been exterminated by man.

Lastly, That these vast deposits, whether formed in the beds of lakes or rivers, or in the estuaries

and basins of the ocean, have been elevated above the level of the waters, and now constitute fertile countries, supporting the busy population of the human race.

Chapter X.

The Study of Organic Fossils considered, and the proofs they contribute to the evidences of Design in Creation briefly reviewed.

Of the results which have attended the researches of Geology, none can be more curious or interesting, more splendid or important, than the discovery that numerous races of animated beings, most of which were unlike any known forms in existing creation, inhabited our planet before mankind were placed upon its surface; or than the restoration, at this distance of time, of the animals and plants which successively inhabited the earlier surfaces of the globe; their relics, in the character of sparry or marble sculptures, or fossil bones encased in the solid rock, beneath the thin stratum which marks the comparatively short past duration of the existing order of nature, being preserved in a fossil state, as if to invite the wondering inquiry, and advance the instruction of mankind.

The facts, that previously to the creation of man, the earth was inhabited, during a long succession of ages, by many different races of animals, which races were successively created, and after long duration extinguished from its surface, to be followed by new races, differing often as much from preceding kinds as from those which now inhabit the globe, and that its surface has been visited by great changes of condition, as also that many convulsions have occurred upon it, are facts very startling in themselves, and for which the previously received opinions formed upon the Mosaic account of the Creation and Deluge, had not at all prepared the student of fossil nature. Those facts are, nevertheless, established upon evidence too clear, too infallible and valid, to admit of the slightest reasonable doubt.

But the great value and importance of these results arise from the proofs contributed in the relics of the several by-gone creations, thus shewn to have had existence upon our globe, that they were derived from the direct exercise of Divine power, and formed, sustained, and regulated, as obviously as are the members of existing creation, upon those principles, and with that all-wise and benevolent adaptation, which declare the boundless wisdom, goodness, and perfection of their Creator.

As the study of organic remains has exhibited the point at which life had its first beginning upon the globe; so, it has contributed proofs that every variety of organic structure placed on it in that beginning,

and in the successive creations of subsequent times, was "created in the fulness of perfection and complete adaptation,"—a perfection *originally complete* in the first-created structures, and perpetuated to the last, and therefore neither requiring or gaining one feature of completion from any duration of their races, or any renewed exertions of creative power. And while these facts enforce the conviction that all organic life originated in the direct fiat of Omnipotence alone, and that, "without Him was not anything made that was made," so their repetition through all the defined and differently characterized periods of organic life, and through the monuments of the thousands of ages during which it has existed on our planet, equally convince us of the constant superintendence of the Creator, whose hand we trace in all.

It is the exalted result of these investigations to discover throughout the fossil world, as in existing nature, "an Omnipotent architect, and His constant provision for the wants of the terrestrial inhabitants, not only visible in the period in which He laid the first foundations of the globe, but also throughout the long series of changes which he has caused subsequently to pass over it." And while the "clusters of contrivances" by which every living species in nature is adapted to its own peculiar condition, are familiar to every comparative anatomist, the Geologist is enabled, by the study of the fossil world, to demonstrate that they began not, with

existing kinds, for he illustrates an identity of design in the extinct forms of the same genera or species, and of the animals which are no longer known upon the earth. In illustration of this important result, Professor Sedgwick takes occasion to refer to the fact, that the proofs of Supreme intelligence and design which are furnished to us, in passing from one order of beings to another, as they stand arranged in a museum, collected from *existing* orders, "by the continued repetition of the same organs, combined in each successive instance in different proportions and manner of adjustment, to accomplish the particular object of their application," are equally furnished to us in a similar collection from the fossil contents of the ancient strata;—and observes, that "whenever we find a general plan pursued constantly, yet with such variations as are in each case required by the particular object, we possess, in such a plan, and such an adaptation, the strongest possible testimony of presiding intelligence."

In the discovery, for instance, of the "visual organs of animals that ceased to live many thousands, and perhaps millions of years ago, buried in the early strata of the transition formations," evidence has been adduced of "an identity of mechanical arrangements adapted to the construction of an optical instrument, precisely similar to that which forms the eyes of existing animals, and affords the example of an agreement that cannot be explained

without reference to the exercise of one and the same creative power."*

In every other part of the structure of fossil animals are evidenced the same well-balanced relations to its designed use, as are manifested in the various organs which compose the structures of existing orders in creation, "and thus," says the learned Professor just quoted, "at points of time separated from each other by the intervention of incalculable ages, we find an identity of objects effected by instruments so similar, as to leave no possible doubt of the unity of the design in which they all originated."

It will be seen, then, that the study of organic remains has not only acquainted the geologist with the history of animated nature upon the globe, with the fact that its surface has, at remote periods, been inhabited by animals of a kind and structure unknown in existing nature, and that several of the species and even families of the ancient inhabitants of the globe have actually disappeared from the existing ranks of creation, but that this splendid object of investigation has shewn, that all these ancient creatures presented conclusive evidences of adaptation to the terrestrial conditions in which they lived, and furnished, in their anatomical structure, the same evidence which existing kinds afford, to the exercise of an all-wise and benevolent adaptation to their immediate conditions and object of existence.

* Professor Buckland, Bridgewater Treatise.

We contemplate with great interest, in the long-sealed catacombs of ancient Egypt, the embalmed memorials of the extinct people who flourished in that country, at a distance of more than thirty centuries from the present time. But with much greater curiosity must we view the records enclosed in the actual strata which are around and beneath us in every direction, of the various animals which inhabited the globe before man succeeded to its surface. In the one case we behold the beings of a distant period in human history embalmed by art, and we eagerly trace the process by which their preservation has been effected, and deduce the history which they record of the condition of their country and their cotemporary inhabitants, at the distant period in which they lived. In the case of geological investigations we contemplate the relics of the actual creatures by which the globe was inhabited, in ages anterior by many thousand years to the creation of mankind, embalmed it may be said, by the great operations of nature. And with additional interest must we view them, now that science has rendered their fossil structures so clearly illustrative of the terrestrial conditions and events of periods far anterior to the existence of the human race.

Geology unfolds to us these records upon the most magnificent scale, and filling the recesses of an unfathomable antiquity. Few of the formations above the micaceous slate are destitute of the

remains of animals, and in a less degree, easily accounted for, of vegetables: but the larger part of those formations is filled with such remains, constituting in some cases nearly the entire substance of rocks, which are hundreds and thousands of feet in thickness, and many miles in extent. Some of the Egyptian pyramids are built of nummulitic limestone, itself entirely composed of chambered shells, of very small size and exquisite construction. Other rocks there are whose very substance consists of microscopic shells of extraordinary beauty, once the habitations of living beings. Among these are our English Chalk, the Bergmehl of Sweden, and the polishing stone first obtained from Tripoli, but since found in many other places. Of this latter, the exquisite shells, almost entirely siliceous in their composition, which appear to constitute the whole rocky masses, are so minute, that a cube of one tenth of an inch is calculated to contain five hundred millions of individuals. In the series of the Oolite and Lias rocks, which come under the Chalk, and, in England and many other countries, overlie the new red sandstone, are found in immense numbers, not only the shells of smaller sea animals, but the skeletons of formidable creatures, some of gigantic size, formed for swimming in the sea and crawling near the shores. We can see and examine their powerful teeth; the structure of their bones for the insertion, course and action of muscles, nerves, and the tubes for circulation, indicating the function;

and their very stomachs beneath their ribs, replenished with bones, fish scales, and other remains of animal food."*

The discovery of myriads of fossil structures imbedded in the strata of the globe, and far beneath "the slight stratum of life which blooms on the terrestrial surface," is of itself one of a most curious and interesting character; but it is rendered yet more surprising by the facts, that most of these remains, though now enclosed in solid rock, and occurring far from the present boundaries of the ocean, are identified with the sea, not only as the relics of its former inhabitants, but as the infallible memorials of its having long resided on the very situations where they now occur, and, that their amount far surpasses numerical calculation. The very mass of shelly-limestone rock is found to be absolutely composed of accumulated remains of structures that once had life, and of the fossil relics of the coral and other zoophytic inhabitants of the ocean which submerged that rock; a single ounce of a stony deposit found in the Tuscan hills contains many thousand minutely chambered shells, and other kinds of petrified deposits enclose as vast an accumulation of shells, once the domicile of the ancient population of the seas. The very superstrata of the globe are chiefly composed of the wreck of marine and terrestrial organizations. The

* Dr. Smith, Relation between some parts of Scripture and Geology, p. 99.

stone walls of our buildings enclose myriads of structures that once had life. The blocks which form the pyramids of Egypt and some other enduring monuments of antiquity, possess within their own composition the memorials of an antiquity more profound than that of the age when the hand of man detached them from the quarry, and shaped them to command the wonder of posterity at a distance of three or four thousand years. The atmosphere of our dwellings is warmed, and their interior illuminated, by substances chemically composed from the wreck of a vast succession and luxuriant abundance of vegetable life; and the very ornaments which adorn the living, are often as polished caskets enclosing the remains of animals that existed at a distance of many thousand years. Well may it be said that the actual surface of the globe reposes on the ruins of an elder world!

But anatomical investigations have deduced from these phenomena, results still more surprising than the occurrence, the situations, or the incalculable number of organic fossils. The remains of marine plants and animals are found to constitute the largest proportion of the remains of the early inhabitants of the globe, now preserved in the fossil state. The alternation of these organic deposits with strata containing the remains of land animals and plants, is a feature of great curiosity and importance, as it infallibly announces revolutions in the land and sea. But, what is still more surprising,

we find that most of the fossil remains which occur both in Europe and in other parts of the known globe, belong to species, and many of them to kinds, that have long become totally extinct. So great is this distinction of organization, as in many cases to prevent our identifying a whole tribe whose remains are found in the fossil state, with any known recent kind or species. We also find that particular animals have characterized particular periods only, and have disappeared from more recent creation; and that, as in the case of the great Secondary formation, the existence is recorded of a system of organic life unlike the present, a fact that leads to the inference that terrestrial conditions also unlike the present must have then prevailed. Other inferences of great importance and curiosity are connected with the phenomena of organic fossils; and as our investigation of them is now conducted on scientific and infallible principles, we are enabled to restore and re-arrange the very structures of these most ancient animals, to assign them to their existing types where any such exist in nature, to pourtray the character of these ancient creations where they are extinct, and further, to connect, and as it were reanimate them all, as the faithful and only historians of their particular periods of the globe.

The anatomical relations between these fossil and the existing kinds and species, may be said to constitute the leading wonders of Geology; while

the similar evidences of adaptation which are furnished, and the identity of principle in construction which is evidenced, in animals whose structures present these astonishing differences in their formation, are among the most important truths that science could have added to the proofs of the constant government, the wisdom and beneficence of God.

As the varied objects of our examination in these departments of the fossil world, necessarily often occur in broken and detached portions identified with the rock in which they are enclosed, it is obvious not only that we must be indebted to comparative anatomy—to that system and rule of induction which the illustrious Cuvier was the first to apply—for the means of attaining the most important of the results deduced from their investigation; but, that the value of conclusions derived from the application of those methods of reasoning implies, and must depend upon, the existence of a harmony of system throughout the existing and fossil orders of creation. And such is that harmony of system that the geologist is enabled to infer "from the character of a single fossil bone, the proportions of the other bones, and the very framework of an extinct animal;" and knowing how invariably all the parts of organic structures are adapted to the specific condition of the creature in which they unite, he is enabled to ascertain the food, the habits, and characteristic peculiarities of animals that successively possessed the globe in

periods of remote antiquity, and whose very genera as well as species have in most cases actually disappeared from existing creation. For those variations from the present orders of animated nature, which render the many remarkably constituted inhabitants of the ancient globe, objects of so much wonder and curiosity, are found to embody the very same principles of construction, and to exhibit the same well-balanced relations to external nature, which are manifested in the existing orders of creation; and while they are thus identified as parts of one and the same grand and harmonious system, and as the work of one and the same Almighty hand, they furnish a system of analogy which enables the geologist to deduce from a fragment of bone, in any given formation of the strata, a chain of most important and valuable reasonings with reference to an early condition and cotemporary inhabitants of the globe.

In our inquiries with regard to anatomical relations between existing and fossil species, we find that many groups occur in both the fossil state and in existing nature; while in some cases, where an entire class remains, several or all of its earlier species are extinct, those earlier species seeming to have disappeared from creation when the condition to which they were adapted and "with which they arose," underwent a change. Some orders as well as species occur in the fossil state alone; thus, the Trilobites (the earliest known examples of

articulated animals) vanished from the globe before the period of the Secondary formations; and thus also, in another period representing the dawn of the existing system of animated creation, the remains of fifty species of an extinct family of mammalia are known. There are particular strata and localities connected with the tertiary formations that contain the remains of animals now totally extinct, which must have been of enormous size, and were of peculiar formation. Several species of an entire class of organic fossils in the Slate system have vanished; and below the Secondary series all the remains of fishes have the forms which are now the most uncommon. Other organic structures, such as the Ammonites—the extraordinary inhabitants of apparently a turbulent ocean—have different characters in different series. These ancient fossils are among the most interesting and instructive of organic remains. Their gigantic shells, (now identified with the mass of their stony tomb,) were constructed with hollow chambers, which the inhabitant could fill with air, and thus rise or sink in the ocean at will. The system of these air chambers is "a delicate and astonishing hydraulic contrivance," and the whole shell exhibits a systematic union of buoyancy and strength. In them we find "the inventions of human art anticipated in the works of nature; and the same principle applied to resist the pressure of the sea upon the shells of Ammonites, that an engineer makes use of in fixing transverse

stays beneath the planks of the wooden centre on which he builds his arch of stone." These fossils therefore peculiarly exhibit "an order and method which cannot have existed without the direction and agency of some commanding Intelligence." Their petrified structures found at Lyme Regis and other remarkable localities, are all that now remain of these wondrous inhabitants of the ancient sea. And it is a curious fact, that of all their species, though amounting to no less than two hundred, none are continued in existing nature.

Among the early members of the class mammalia, the ancient land and other quadrupeds, more thick-skinned animals existed than are found in the present system. Of these the Dinotherium and the Megatherium, and some other gigantic animals, all now totally extinct, are remarkable instances. The former of these great fossil mammalia attained the length of eighteen feet, and its cumbrous structure indicates the amphibious mode of life for which its anatomical characters declare it to have been adapted. The Megatherium, which attained the length of twelve feet, was, on the other hand adapted, by the immense breadth of its feet, the curious contrivance for maintaining the sharpness of its teeth, its "impenetrable cuirass and bony armour," (for it was too ponderously equipped to avoid its enemies by flight,) to inhabit a marshy country, and feed on leaves and roots; this animal not having belonged to the carnivorous order.

The Saurian tribes, whose remains abound in the strata of the secondary formations, are perhaps the most remarkable among the various subjects of this inquiry. And we cannot proceed in the contemplation of this very extraordinary class of the now extinct inhabitants of a former system of nature, without finding materials for the utmost astonishment and instructive reflection.

The colossal structure of the Iguanodon (for the discovery of whose fossil remains, in the strata of Tilgate forest, Sussex, Geology is indebted to Dr. Mantell, by whom they have been most ably described,) furnishes an extraordinary instance of the gigantic character of reptile life which once flourished on the globe. The Iguanodon must have attained a length of from fifty to seventy feet.

Vertebræ of another Saurian have been discovered in the Portland series, near Thame, of yet more surprising dimensions, those remains being described to be twice as large as those of the Iguanodon.

The discovery of the Plesiosaurus too, a fossil approaching the genus crocodile, but whose neck contained double the number of vertebræ, has been truly said to form one of the most important additions that Geology has made to comparative anatomy.—"Its characters were the most monstrous that have been yet found amid the ruins of a former world. To the head of a lizard it united the teeth of a crocodile; a neck of enormous length, resembling the body of a serpent; a trunk and tail

having the proportions of an ordinary quadruped; the ribs of a chamelion, and the paddles of a whale."

All these remains "have been interred" (says Dr. Buckland) "for thousands of years, amid the wreck of millions of extinct inhabitants of the ancient earth,"—and their restoration peculiarly exemplifies the triumph of modern science. These extinct families of gigantic reptiles, together with crocodiles and lizards, which by their peculiar formations were evidently fitted to the conditions of the earlier surface of the globe, were the "great possessors of the earth and seas." Their genealogy extended to a period of the highest antiquity; and long antecedent to the creation of the human race, was that distant time when these ancient families were called from their long possession of the early surface of the globe. We cannot fail to regard them with peculiar interest, for they seem to form the privileged and exclusive historians of periods of lengthened duration, and of those ages in particular when reptile life predominated on the globe, and the history of which would, but for these astonishing remains, be involved in the obscurity of primeval time. And the greater importance attaches to their investigation, as the surprising structure of these extinct Saurian tribes, furnishes, in the structure of animals totally different from any living forms, additional illustrations of the Creator's varied power; while in their relations to particular periods and conditions His wisdom and beneficence are equally proved.

In the limits of this essay, a brief reference only can be made to the very satisfactory proofs of adaptation, which are afforded in the restored forms of these very ancient inhabitants of the earth. Indeed, the evidences of Design which they present, have been so ably and instructively elucidated, and in particular by the Rev. Professor Buckland, that it is unnecessary to go through these evidences in the present discourse. In illustration, however, of their nature, one of the most particularly interesting and satisfactory sources of these important proofs is here selected, reference being made to the many evidences of adaptation which are furnished in the remains of the Icthyosaurus of the ancient globe; to its hollow vertebral column of a hundred joints; to its four broad fins or paddles, not unlike the paddles of the existing whale, by which it was enabled to move in the sea or on the shores at will; to the bony defence which surrounded the orbit of its enormous eye, an organ which actually attained a foot in diameter, in the same way as the eye of "the golden eagle," is surrounded; to the means by which this large surface of the eye was strengthened, as if to resist the pressure of the water; to the thin plates of bone, spliced together by cross-bracings, (analogous to those adopted in naval architecture) which gave strength with the smallest weight; to the construction of the ribs, by which this extraordinary animal was probably enabled to retain air beneath the water; and to the

construction of its chest, which is similar to that of an animal at present inhabiting the lakes of New Holland. And similar "clusters of contrivances" are exhibited among the other ancient inhabitants of the globe. Such combinations are not united in any member of existing creation, though like the Hand of their Almighty originator, they are separately visible in each of the animals which now accompany mankind. But there are animals in existing nature, which for specific purposes, possess some of the combinations that co-existed in these most curious and extinct inhabitants of the ancient globe; and we thus perceive conclusive proofs of an identity of plan, and connexion of system, as illustrated in the structure and functions of organic beings, whose respective periods of existence are, in all probability, separated by unnumbered ages of time. In these investigations we perceive the most "beautiful analogies running through the whole chain of anatomical structure" in all its different periods; and thus is our conviction strengthened of the unity of the design to which they may all be traced.

The fossil remains of the vegetation which clothed the ancient surface of the earth, illustrate the Creator's power, His wisdom and beneficence, in no less impressive features than do the fossil remains of the gigantic quadrupeds and reptiles which once occupied our planet. For in the investigation of fossil plants, the same proofs of beneficent contrivance and designed adaptation to terrestrial con-

ditions, and to specific purposes in the economy of nature, are presented, as those which arise at every step in the examination of animal structures. And in this extensive and still more ancient department of creation, illustrations equally characteristic, and evidences equally satisfactory are furnished, of the operation of the Divine Hand by which it has been governed. These results are the more important, as changes similar to those which have affected organic life in the animal creation, are proved to have occurred in the characteristic features of the vegetation which clothed the ancient globe. The study of the fossil vegetable world supplies also, much of the information we possess, in reference to the early conditions the globe ;—it is, in fact, from the fossil remains of plants, almost exclusively, that we derive the history of periods less remote than those conditions of the globe when its surface did not support organic life, but, nevertheless, anterior to the existence of some classes of animals upon the land.

We find then, that by the study of organic remains, Geology has been enabled to demonstrate facts, which must otherwise have for ever remained unknown to man, and shrouded in the obscurity of primeval time; to restore, at this distant period, the first and successive inhabitants of the ancient globe; to enlarge and illustrate natural history, and to extend its province into an elder world—a range accessible to these researches alone; to reconstruct animals which have not only ceased to exist on the

terrestrial surface, but which, by their anatomical character, and complete difference from any existing members of creation, surpass in many cases, the creations of fable or imagination; to ascertain, by comparison of these surprising relics with existing types, where any such remain, the relation of ancient systems to the present system of organic life; and, passing from discovery to inference, to prove that they were as fully adapted to terrestrial conditions, as we know the present inhabitants of the globe to be; and finally, therefore, to announce the existence in an earlier world, of the same harmony of design, and unity of purpose that pervade existing creation.

Chapter XI.

The study of the Mineral Structure of the Globe recommended, as furnishing additional evidences of beneficent adaptation and design.

As remarked by Professor Phillips, "the magnificent spectacle which the phenomena of the terrestrial structure present to our contemplation, must impress upon even the most casual observer, a sentiment of respect for the sublime objects of geological inquiry." And upon an attentive observation of that structure, its varied phenomena are found indeed to

supply an endless source of interest and instruction, whether we view them with reference to their mineral characters, their general arrangement, their endless diversity, the external features to which they are related, or the internal treasures of varied kinds, which the strata of the earth enclose. In the lofty elevation of the mountain, the bold escarpment of cliff, the undulating surface of the plain, the alternation of hill and dale, and the general distribution of land and water on the terrestrial surface, from all which features Geology discloses the ancient history of the globe, and announces the nature and character of the events by which it has been affected from periods of remote antiquity, we are presented also with most striking instances of designed adaptation, of relation between the mineral and vegetable kingdoms, and of their mutual subserviency to the welfare of mankind. For it is not only the province of the geologist to trace, through these monuments of nature, the series of events which they commemorate, but to shew that the revolutions through which the surface of the globe has advanced to its present condition, and has become stored with all its animal, vegetable, and mineral forms, and "made fit for the residence of man," have ever been directed by presiding Wisdom and Beneficence, with a view to the benefit of the inhabitants of the globe.

Upon investigating the fabric of our planet, so far as we are enabled to ascertain its structure, (for though science has opened to our contemplation the

boundless range, and distant regions of universal space, it has not shewn the structure of our own planet beyond a few miles in depth,) we find that by far the greater portion of its surface is occupied by rocks which were deposited in water, and occur in the form of strata, more or less approaching to a horizontal position, those strata succeeding each other in a certain order, possessing very different degrees of antiquity, a great extent of continuity over the globe, and enclosing myriads of fossil remains of plants and animals, for the most part distinct from those of the present day, though formed on the same general principles. We further find that "this system of stratified rocks extends to a variable depth, and that below it and amongst it occurs a set of rocks which are not stratified, and do not contain organic remains, but consist of such minerals, and occur in such circumstances, as to be clearly the result of igneous agency."

We likewise trace in the structure and arrangement of these stratified deposits, and the formations derived from them and the older unstratified and igneous rocks, the most impressive testimony of their adaptation to the economy of animal and vegetable life. The igneous rocks are the repositories of valuable minerals and metals, of ores, and other substances which immediately contribute to the welfare of mankind, and they are so collocated and distributed as to render these treasures the most accessible to human industry, and the most condu-

cive to ultimate purposes in the economy of nature. Being the least productive of a fertile soil, they chiefly form the mountain districts of the globe, and they thus contribute to the formation of derivative strata adapted to the support of vegetable life. Another "valuable contrivance in the structure of the earth," observes the Rev. Professor Buckland, "is, that nearly all its materials are such as to afford, by their decomposition, a soil fit for the support of vegetable life, and that they are calculated to undergo, and have undergone, a superficial decomposition. Here," continues the Rev. Professor, "is an instance of relation between the vegetable and mineral kingdoms, and of the adaptation of the one to the other, which always implies design in the surest manner; for had not the surface of the earth been thus prepared for their reception, where would have been the use of all that admirable system of organization bestowed upon the vegetable world?" Nor does the general disposition of the masses of stratified and other rocks with reference to their mineral character and relative capability of contributing to those purposes, afford a less convincing proof of superintending design. In all the monuments of the great operations of nature which the geologist is thus enabled to trace, this grand system of mutual relation and prospective adaptation is exhibited—a system by which the globe has been adapted to each successive condition of its inhabitants, and has gradually attained the features which

ultimately adapted its surface to the residence of mankind.

Our inquiries into the history of inorganic matter, and of the agencies by which these great effects have been produced, furnish remarkable illustrations of our concern in events which affected the globe, in ages long antecedent to the existence of mankind. Thus, the situations chosen for human residence are shewn to be in many cases directly connected with events which occurred in those remote ages of the world; the establishment of some of the proudest cities, to be related to the existence of some great monuments of the geological events which affected those localities; and the strength and prosperity of a nation to have originated in the results of operations which affected a particular country, in periods before it was last elevated from the sea.

The relation of events of the most remote antiquity to the immediate welfare and prosperity of the human race, cannot be more satisfactorily illustrated, than in the consideration of the extensive Coal formations, which invite our attention first among the varied products in the mineral world. They are the vast storehouses in which "the forests that waved on the surface of the primeval world," are treasured up for the benefit of mankind. The mineral kingdom does not present to us, throughout its varied range, any department that can furnish a more striking history of the early conditions of the

terrestrial surface, or a more forcible and continually recurring illustration of beneficent design. For the prospective system of adaptation which we everywhere discover, is most forcibly exemplified in the fact, that the vegetation which clothed the globe in remote periods of time, and before the creation of the human race, has been rendered subservient to their welfare. Until we had been enabled to trace and to identify the vegetation deposited in the fields of coal, it would not have been anticipated that this valuable mineral could tell of the luxuriant verdure which clothed our planet, in periods separated from our own by thousands of years; or that in this, its altered character, it could, while lighting and warming our habitations, announce to us the operations and chemical agencies by which the remains of that early vegetation have been accumulated, and those accumulations transmuted into coal, in the subterranean laboratories of nature. "Absorbed from their native atmosphere, and from the earth, the elements which composed the vegetation that adorned the earlier surface of the globe, commenced their long series of transmutations, by first entering into the substance of the plants, which flourished in tropical luxuriance on its surface; torn from that surface and transported to estuaries, they sank in the waters, and there buried, became transferred to a new state among the members of the mineral kingdom. During the long interment that followed, a course of chemical changes, and new combinations

of their elements, have converted those plants into the mineral condition of Coal. To these changes, volcanic agencies, and other causes of geological revolution, having succeeded, the coal strata thus produced have been raised, and become accessible to man; from whence the miner, aided by the steam engine and safety lamp, brings them to the surface." "Returned once more to the light of day, and a second time committed to the waters, this valuable mineral has, by the aid of navigation, been conveyed to the scene of its next and most considerable change by fire—a change, during which, it becomes subservient to the most important wants of man. But still it does not undergo annihilation, for its elements return to their native atmosphere, from which they were absorbed to take part in the primeval vegetation of the earth, and to-morrow contribute to the substance of timber in the trees of existing forests. And when decay or fire shall once more consign them to the earth, or to the atmosphere, the same elements will enter on some further department of their perpetual ministration in the economy of the material world."

Few persons are aware of the magnificent spectacle that is presented in the coal mines of many countries. Those of Bohemia are particularly beautiful, and the following description is too graphic to be omitted here. "The most elaborate imitations of living foliage upon the painted ceilings of Italian palaces, bear no comparison with the

beauteous profusion of extinct vegetable forms with which the galleries of these instructive coal mines are overhung. The roof is covered as with a canopy of gorgeous tapestry, enriched with festoons of most graceful foliage, flung in wild irregular profusion over every portion of its surface. The spectator feels himself transported, as if by enchantment, into the forests of another world; he beholds trees, of forms and characters now unknown upon the surface of the globe, presented to his senses almost in the beauty and vigour of their primeval life, their scaly stems and bending branches, with their delicate foliage, are all spread forth before him, little impaired by the lapse of countless ages, and bearing faithful records of extinct species of vegetation, which began and terminated in times, of which those relics are the infallible historians."

The Rev. Dr. Buckland, in his Bridgewater Treatise, observes,—"The important uses of Coal and Iron, in ministering to the supply of our daily wants, give to every individual among us, in almost every moment of our lives, a personal concern, of which but few are conscious, in the geological events of these very distant eras. We are all brought into immediate connexion with the vegetation that clothed the ancient earth, before one half of its present surface had yet been formed. The trees of the primeval forests have not, like modern trees, undergone decay, yielding back their elements to the soil and atmosphere by which they had been nourished;

but treasured up in subterranean storehouses, have been transferred into enduring beds of coal, which in these later ages have become to man the sources of light, and heat, and wealth. My fire now burns with fuel, and my lamp is shining with the light of gas, derived from coal that has been buried for countless ages, in the deep and dark recesses of the earth. We prepare our food, and maintain our forges and furnaces, and the power of our steam engines, with the remains of plants of ancient forms and extinct species, which were swept from the earth, ere the formation of the transition strata was completed. And thus, from the wreck of forests that waved upon the surface of the primeval lands, and from ferruginous mud that was lodged at the bottom of the primeval waters, we derive our chief supplies of coal and iron, those two fundamental elements of art and industry, which contribute more than any other mineral production of the earth, to increase the riches, and multiply the comforts of mankind."

The Coal formations are only a part (though a part in which we more obviously perceive our interest) of "the treasures which Providence has laid up in the rich storehouses of the interior of the earth." It would far exceed the limits of this discourse, to review all the benefits we derive from the mineral structure of our present habitation, and from the designed arrangement of the component masses of its crust; but viewed only in the light of

subserviency to our use, we find that "in every region the nature and disposition of the substrata lie at the foundation, not only of its agricultural productiveness, but also of its capability of supplying the materials which form the basis of its industry and arts." *

Chapter XII.

Theological Results contributed in the cultivation of Geology, and more especially by the examination of Fossil Organic Remains.

It has been remarked, I believe by M. Baillie, that if the human mind can ever flatter itself with having been successful in discovering the truth, it is when many facts, and those facts of different kinds, unite in establishing the same result. It needs not any argument to prove, that the highest result by which the cultivation of comparative anatomy, and the extension of zoological and botanical investigations, aided by the application of kindred science, can be rewarded, is the collection and deduction, from the many facts of different kinds, and from the varied races in existing creation which it is the province of those studies to investigate, of arguments that concur in establishing the

* Presidential Address to Geol. Soc. 1840.

existence and operation, as shewn throughout the wide range of such inquiries, of one grand, comprehensive, and beneficent design. That such is the result of these investigations in the departments of animated nature with which mankind are immediately associated on the globe, no reasonable being can deny; and it would seem, therefore, that the mind engaged in such investigations, and successful in collecting and deducing such testimonies, and in finding them unite to establish the same result, might flatter itself with having been successful in discovering the truth.

But how greatly must this satisfaction be heightened, and how much must the conviction that the result thus arrived at *is* the truth, be corroborated and enforced, when the geologist announces that investigations conducted with a similar object in the more ancient and more wondrous department of the Creator's works, which it is the triumph of his own science to disclose, and the privilege of his own science to display, are there also attended with the same result! In the science of Geology, the fossil remains of the successive inhabitants of the ancient globe, the restored structures of plants and animals which successively occupied its surface in periods of remote and profound antiquity, and whose species and even genera are no longer continued in the ranks of existing nature, are equally rendered tributary to the establishment of that result, viz., to the demonstration of the eternal being,

the wisdom, and the goodness of God. And in the venerable province of geological research, the operation of the same beneficent care and provision that are displayed throughout existing creation, is carried back to the earliest dawn of organic life upon the globe, to ages separated from us by, in all probability, many tens of thousands of years;—the beneficent and all-wise adaptations to specific purposes and actual conditions, which are exhibited throughout the existing races in animated nature, are by geological research equally illustrated in the monuments of the succession of dissimilar phenomena which the strata of the earth present, and in the fossil remains of structures which, for thousands of ages have ceased to exist, and in the monuments of events too remote for calculation. The eternal being of God, and the continued operation of His power are here established and displayed, throughout, as well as from the commencement of, the thousands of ages whose existence and whose flight are revealed and recorded in the fossil world; and the evidences of His wisdom and His goodness are here, through periods of incalculably lengthened duration, most clearly and satisfactorily displayed.

Since, therefore, the researches of Geology thus convincingly furnish, from their wondrous province, results of the same theological character as those which are deduced in the investigation of existing nature, and add to the testimonies derived from the latter source, the venerable sanction and corrobora-

tion of the distant ages which the researches of Geology have, as by enchantment, recalled and displayed, and since, also, the many facts of different kinds disclosed in geological investigation unite in establishing those results by "a chain of evidence amounting to demonstration," the mind engaged in the cultivation of such researches may reasonably flatter itself with having been successful in discovering the truth.

That such results are actually established in the pursuit of geological investigation, is well known to all persons engaged in their deduction; and will, I trust, have been made apparent to any noviciate reader by the arguments I have already enumerated on the subject. For we have seen that it may be with truth affirmed, that Geology has not merely opened in the fossil world new scenes of wonder and astonishment; that it has not merely acquainted us with the nature of the changes and revolutions which have visited our planet; nor merely exhibited its ancient surface inhabited by creatures of wondrous structure whose species have long ceased to exist, and by plants of which no living species are known; since Geology has traced, through monuments of most remote events, demonstrative and accumulated proofs of constantly presiding Intelligence and superintending Design; and, satisfactory as it was to find an identity of principle pervading all living kinds, Geology has added the yet more satisfactory demonstration that living and fossil kinds are all

connected by one plan of organization, attesting the identity of the Design that has effected so many similar ends through such a variety of instruments, the principle of whose construction is in every instance fundamentally the same.

Nor in the phenomena connected with the developement of organic life upon the globe, are proofs of the operation and immediate interposition of Supreme Intelligence and Power less evidently afforded; for, "in the repeated and almost entire changes of organic types in the successive formations of the earth—in the absence of mammalia in the older, and their very rare appearance (and then in forms entirely unknown to us) in the newer secondary groups—in the diffusion of warm-blooded quadrupeds (frequently of unknown genera) through the older tertiary systems—in their great abundance (and frequently of known genera) in the upper portions of the same series—and, lastly, in the recent appearance of man on the surface of the earth (now universally admitted)—in one word, from all these facts combined, we have a series of proofs the most emphatic and convincing,—that the existing order of nature is not the last of an uninterrupted succession of mere physical events derived from laws now in daily operation: but, on the contrary, that the approach to the present system of things has been gradual, and that there has been a progressive developement of organic structure subservient to the purposes of life. Considered as

a mere question of physics, (and keeping all moral considerations entirely out of sight,) the appearance of man is a geological phenomenon of vast importance, indirectly modifying the whole surface of the earth, breaking in upon any supposition of zoological continuity, and utterly unaccounted for by what we have any right to call the laws of nature." Rev. Professor Sedgwick, Presidential Address to Geol. Soc. 1831.

The theological value of these results is thus forcibly stated by the Rev. Professor to whose writings I am so greatly indebted—

" In all the numerous examples of Design," says Dr. Buckland, " which we have selected from the various animal and vegetable remains that occur in a fossil state, there is such a never failing identity in the fundamental principles of their construction, and such uniform adoption of analogous means, to produce various ends, with so much only of departure from the common type of mechanism, as was requisite to adapt each instrument to its own especial function, and to fit each species to its peculiar place and office in the scale of created beings, that we can scarcely fail to acknowledge in all these facts, a demonstration of the unity of the Intelligence in which such transcendant harmony originated; and we may almost dare to assert, that neither atheism or polytheism would ever have found acceptance in the world, had the evidences of high Intelligence and of unity of Design, which are disclosed by

modern discoveries in physical science, been fully known to the authors or the abettors of systems to which they are so diametrically opposed. It is the same handwriting that we read, the same system and contrivance that we trace, the same unity of object and relation to final causes, which we see maintained throughout, and constantly proclaiming the unity of the great Divine Original."*

And again—

"The view which we have taken of the connexions between the extinct and living systems of the vegetable kingdom supplies an extensive fund of arguments, and lays open a new and large field of inquiry, both to the physiologist, and to the student in physico-theology.

"In the fossil Flora we have not only the existing fundamental distinctions between endogenous and exogenous plants, but we have also agreement in the details of structure, throughout numerous families, which indicates the influence of the same laws that regulate the development of the living members of the vegetable kingdom.

"The remains of Fructification, also, found occasionally with the plants of all formations, shew still further, that the principles of vegetable reproduction have at all times been the same.

"The exquisite organizations which are disclosed by the microscope, in that which to the naked eye is but a log of lignite, or a lump of coal, not only

* Rev. Professor Buckland, Bridgewater Treatise, p. 584.

demonstrate the adaptation of means to ends, but the application also of similar means, to effect corresponding ends, throughout the several creations which have modified the changing forms of vegetable life.

"Such combinations of contrivances, varying with the varied conditions of the earth, not only prove the existence of a Designer, from the existence of method and design; but from the connexion of parts, and unity of purpose, which pervade the entirety of one vast, and complex, but harmonious whole, shew that one, and the same Mind gave origin and efficacy to them all." *

Of the theological value of the evidences of co-relation, and identity of plan, which are so abundantly furnished in the cultivation of our researches in fossil organic remains, a striking illustration is furnished in the following argument of Dr. Paley, which was founded upon the evidences derivable in the range of existing creation.

"If," says that learned and amiable theologian, "one train of thinking be more desirable than another, it is that which regards the phenomena of nature with a constant reference to a supreme intelligent Author. To have made this the ruling, the habitual feeling of our mind, is to have laid the foundation of every thing that is religious; the world thenceforth becomes a temple, and life itself one continued act of adoration. The change is no less than this,—that

* Bridgewater Treatise, by Dr. Buckland, p. 523.

whereas formerly, God was seldom in our thoughts, we can now scarcely look upon anything without perceiving its relation to Him. Of the vast scale of operation through which our discoveries carry us, at one end we see an intelligent Power arranging planetary systems—fixing for instance, the trajectory of Saturn, or constructing a ring of 200,000 miles in diameter to surround his body; and at the other, bending a hooked tooth, or concerting and providing appropriate mechanism for the clasping and re-clasping of the filaments of the feathers of the humming bird. We have proof not only of both these works proceeding from an intelligent agent, but of their proceeding from the same agent;—for in the first place we can trace an identity of plan, a connexion of system, from Saturn to our own globe; and when arrived upon our globe, we can in the second place, pursue the connexion through all the organized, especially the animated bodies which it supports; we can observe marks of a common relation, as well to one another, as to the elements of which their habitation is composed: therefore, *one Mind* hath planned, or, at least, hath preserved a general plan for all these productions; *one* Being hath been concerned in all." How great would have been the praise awarded by Dr. Paley, to the cultivation of geological research, could he have known that it would extend these observations into the fossil world, and would there deduce from sources of such multiplied variety, such unques-

tionable authority, and remote antiquity, "links which before were confessedly wanting" to fill up the chain of evidence to the power, the wisdom, and eternal being of One beneficent Creator.

The examination of the fossil remains of the vegetable kingdom, as it flourished on the ancient globe, contributes evidences no less satisfactory and convincing, to the existence of presiding Intelligence, and a system of prospective design. I have already stated that such evidences result in a particularly high degree from the consideration of the Carboniferous series, as connected also with some of the physical operations on the surface of the globe, "to which we owe" says Dr. Buckland, "the disposition of these precious relics of a former world, (the vegetables which have passed into the state of mineral coal, and are treasured up in the Carboniferous strata,) in a state that affords us access to inestimable treasures of mineral coal." It is also stated by the Rev. Professor, that the examination of the nature of the ancient vegetables from which coal derives its origin, and some of the processes through which they passed in their progress towards their mineral state, and of other important geological phenomena of the carboniferous strata, affords, in the actual utility to man, arising from the condition of this portion of the crust of the globe, additional evidence that it is the result of foresight and design; and after adducing some very remarkable and striking illustrations of the importance of coal, as

applied to the infinitely varied operations of machinery, and of "the influence of coal, and iron, and steam, upon the fate and fortunes of the human race," the Rev. Professor Buckland observes:—

"We need no further evidence to shew that the presence of Coal is, in an especial degree, the foundation of increasing population, riches, and power, and of improvement in almost every art which administers to the necessities and comforts of mankind. And, however remote may have been the periods at which these materials of future beneficial dispensations were laid up in store, we may fairly assume, that, besides the immediate purposes effected at, or before the time of their deposition in the strata of the earth, an ulterior prospective view to the future uses of man, formed part of the design with which they were, ages ago, disposed in a manner so admirably adapted to the benefit of the human race." *

Such then, are the evidences of designed adaptation to the benefit and condition of mankind, which result in the examination of this great storehouse of the ancient vegetation that clothed our planet. But it must not be supposed that the existence of beneficent design is indicated only where a designed adaptation to the benefit of man, may be rendered highly probable, if not actually traced. For, although we seem to have proofs of slow and

* Bridgewater Treatise, p. 538.

designed preparation of the earth for human residence, and may, by increased attention, discover adaptations previously concealed, and may argue thence, that the earth was not so prepared for a being, either "destined to ephemeral existence, or low in the estimation of his Creator," we should take but a narrow and unworthy view of the Creator's works, if we supposed the evidences of beneficent Design to be bounded by our perception of its operations in our favour. I must on this point, cite some remarks of the author of "The Light of Nature." "Some things," he observes, "are of such a kind, as not to admit of being applied to the benefit of man, and others too noble for us to claim the sole use of them. Man has no farther concern with this earth, than a few fathoms under his feet; was, then, the whole solid globe made only for a foundation to support the slender shell he treads upon? Dŏ the magnetic effluvia course incessantly over land and sea, only to turn here and there a mariner's compass? Are those immense bodies, the fixed stars, hung up for nothing but to twinkle in our eyes by night, or to find employment for astronomers? Surely he must have an overweening conceit of man's importance, who can imagine this stupendous frame of the universe made for him alone. Nevertheless, we may so far acknowledge all things made for man, as that his uses are regarded conjointly with those of other creatures, and that he has an

interest in every thing reaching his notice, and contributing either to the support of his body, or the improvement or entertainment of his mind. The satellites that turn the night of Jupiter into day, assist him in ascertaining the longitude, and measuring the velocity of light: the mighty sun, that like a giant holds the planets and comets in their orbits, enlightens him with its splendour, and cherishes him with its warmth; the distant stars, whose attraction probably confines other planets within their vortices, direct his course over the boundless sea, and the inhospitable desert." *

"The earth," says the Rev. Professor Sedgwick, in his Presidential Address to the Geological Society, (1831) "is an atom in comparison with the visible creation; and all we now behold may be but as an atom, in comparison of that which is unseen; and the meanest combinations of material things submitted to our senses, propagate their influence through all space, co-extensive with gravitation, and play their part in keeping up the stability of the universe."

But, to return;—whatever may be the connexion of human welfare with the wondrous works of creation, and the infinite operations of the Creator's power, we are equally enabled to perceive the existence, through all those operations, of an identity of plan, and harmony of design, infallibly demonstrative of

* Tucker's Light of Nature, book iii. p. 9.

the wisdom and the goodness of God. And as it is the science of Geology that enables us to trace these evidences, in the venerable monuments of primeval time, and in the records of creations which long preceded the era of our race, it is clear that it must be the direct tendency of Geology to confirm the evidences of natural religion already existing, and to superadd, in a department of nature of which revealed religion is silent, new and conclusive demonstrations from the inexhaustible sources of instruction which Geology has itself opened to our astonished view. And further, that the cultivation of this science must impress upon the minds of all who rightly consider the phenomena it has brought to light, sentiments of piety, and feelings of devotion. For it is certain that we cannot pursue its investigations, without the strongest conviction resulting to our minds of the agency of "one vast and mighty Intelligence ever directing the entire fabric, both of past and present systems of creation." In each we are enabled "to read the same handwriting, to trace the same system and contrivance, the same unity of object, and relation to final causes throughout all, constantly proclaiming the unity of their Divine Author, and also that one infinitely wise, good, and all-powerful Being has made, and still sustains the whole."

Nor are the evidences of identity of plan, and harmony of design, which are thus deduced from the

collective examination of fossil remains, and from the comparison of its results with those derived from the similar examination the kingdoms of animated nature, as they now exist, the only theological evidences which are contributed by our researches. For the separate examination of the individual members of the widely different and successive systems of creation discovered by the investigations of Geology, equally contributes evidence to the immediate operation of the Creator's power. For "if," as the Rev. Professor Buckland observes, "the existence of contrivance proves the exercise of mind; and if higher degrees of perfection in mechanism are proof of more exalted degrees of intellect in the author from whom they proceeded; the beautiful examples which we find in the petrified remains of most ancient animals, afford evidence coeval and co-extensive with the mountains wherein they are entombed, attesting the wisdom in which such exquisite contrivances originated, and setting forth the Providence and care of the Creator, in regulating the structure of every creature of His hand."—And we must indeed "estimate the works of nature by a different standard from that which we apply to the productions of human art, if we can view such examples of mechanical contrivance, united with so much economy of expenditure, and with such anticipated adaptations to varying conditions in their application, without feeling a profound conviction

that all this adjustment has resulted from design and high intelligence."

Whatever alarm, therefore, may have existed in the earlier stages of geological pursuit, we must feel with Dr. Buckland, that "the time is now arrived when geological discoveries appear to be so far from disclosing any phenomena that are not in harmony with the arguments supplied by other branches of physical science, in proof of the existence and agency of one and the same Creator, that they add to the evidences of religion, links of high importance that have confessedly been wanting, and are now completely filled up by facts, which the investigation of the structure of the earth has brought to light." And although the researches of Geology have established facts which do not agree with the ordinary acceptation of the Mosaic narrative, as to the Creation, they have on the other hand established the existence in remote periods, of "a system of successive creations, fitted to the existing, or predestined state of our planet, a system which appears not only not to derogate from the wisdom and power of the Almighty, but to be perfectly in agreement with the agency of Providence, as taught by the Divine Author of our religion. The world is thus seen, in its formation and continuance, constantly under the Providence of Almighty God, without whose knowledge 'not a sparrow falls to the ground.' "

"Under these impressions," Mr. Parkinson observes,* "we view the results of these several changes and creations, as manifesting the prescience, the power, and the benevolence of our great Creator. The general form of the earth's surface, varied by the distribution of hills and valleys, and of land and mountains—the prodigious accumulations of Coal derived from the vegetables of a former creation, with the accompanying slates and schists—the useful, durable, and often beautiful encrinital and shelly limestones—the immense formations of chalk and flint, and the various series of clays, all demonstrate a careful provision for the wants of man. And the several breaks and faults in the stratified deposits, and the various inclinations of the strata, as well as the vast abruptions by which these several substances are brought to the hand of man, may be regarded as most beneficent provisions, resulting from catastrophes too vast and tremendous for human intellect to comprehend."

It results, therefore, that whether we trace the Creator in the system of animated creation by which our race is accompanied on the globe; contemplate His power as exhibited on the grandest scale in the planets of the solar system, or the more distant worlds of the siderial universe, or as displayed in the minutest of His works upon our own planet; or whether we carry back the sphere of our observation

* Introduction to the Study of Organic Remains.

to the systems of creation which the earth successively supported before the existence of our race, and contemplate the power, the wisdom, and the beneficence of the same Creator, as displayed in the restored monuments and fossil remains of periods, separated from us by myriads of ages;—evidences the most clear and decisive are equally furnished to us at all points, and in all periods of this unlimited natural and chronological range, though in Geology, perhaps more satisfactorily than in any other department of nature, to the eternal Being, the Unity, and the unspeakable Beneficence of Him "who is good to all, and whose tender mercies are over all His works."

Turning from these results of our investigation of the past to the anticipation of the future, let us have regard to another reflection presented to the mind engaged in the contemplation of the innumerable changes which have affected the globe, and of the various creations which have succeeded each other upon its surface; that reflection is, that in the universal change which Geology shews to have been in almost constant operation in the material world, an exalted and consolatory thought arises to the human mind—viz. that if, in the course of the immeasurable periods which Geology opens to our contemplation, there has been (to adopt the language of a distinguished modern author) "a constant developement in every succeeding stage, as well of the *material* as of the *organic* creation; if

the former has advanced from the rock which first stood alone in the waters, to those delightful hills, valleys, mountains, and fields, covered with noble and luxuriant plants, which now form the riches of the earth; and the latter has risen from the lowest link of organic creation, to that glorious image of his Creator, Man; may not this developement, like a Pharos, which in the darkness of night shews the way to the distant harbour, inspire us with the cheering hope that a similar developement may take place in the spiritual world; and that the heavenly guest who animates our perishable clay will rise higher in every stage of existence, and drawing nearer to the ideal of perfection, will acquire more and more exalted intellectual power, the noblest of all enjoyments—that which is truly paradisaical; and after having, in an ethereal form more suited to its mental developement, traversed perhaps the boundless realms of the universe and those planetary systems which may be the abode of beings more highly organized than we are, at length attain supreme bliss, absorption into its Divine source."

"Thus," he continues, "light in every stage has acquired greater brightness through the progress of science; life, a more lofty destination by the revelation of Christianity; Creation a developement greater by the decrees of the Almighty; and each therefore has advanced in the road of perfection,

and approached nearer to the goal where the mighty enigma shall be solved.

"Thus we know that 'in the beginning, when God created the Heaven and the Earth, when the Earth was without form and void, and darkness was on the face of the deep, and the Spirit of God moved on the face of the waters,' the naked rock alone rose from the abyss; that after a chaotic night of countless ages, a new period of Creation began, in the figurative language of the Holy Scriptures, a day of creation, which kindled *vegetable life;* first in the lowest link of the chain, the humble moss, rising in its gradual developement to the nobler plants, with the lofty ever-verdant palm at their head; that after new successive revolutions, organic life began in its lowest link the Zoophyte, whence it gradually rose to the Crustaceæ, the Amphibia, and the Fish; that after renewed convulsions, which raised the bed of the ocean above the clouds, and cast down Alps into the abysses of the sea, those monsters of the primeval world arose, which have now happily disappeared, but whose fossil remains furnish irrefragable proofs of their existence; that at a subsequent stage these were replaced by creatures of a higher kind, the Mammalia; and that finally in the last of those periods of creation, the noblest work of the Almighty, Man, appeared on the earth, and thoughtfully surveyed the paradise that lay stretched out before him."

But to resume; creations which form no part of the system of nature with which we are associated, rise in their varied and astonishing features before our view; and instead of inorganic solitude before man was placed on the terrestrial surface, we find the ancient globe, long ere man succeeded to its possession, peopled with life, and filled with the energy of the Divine presence; and the whole past extent of human chronology shrinks into a mere point as compared with periods of time so vast and extensive as those which Geology opens to our wondering view. We see that the bloom of vegetation, the variety of animal life, are not confined to the present system of nature; but, flourishing in uncounted ages, whose flight is indicated in the monuments of primeval time, display through all those ages the great Architect of nature, and proclaim Him supreme in wisdom as he is in power.

These are the exalted results which sanctify and hallow the pursuit of Geological Science; these, the merits by the possession of which, Geology may be likened to the edifice described in our Lord's sermon on the mount—the edifice founded upon a rock, against which the floods came and the winds blew, but over which they were unable to prevail.

In conclusion, let it be observed, that if in Geology the approach to truth by the way of actual investigation "be slow, it is sure; that facts command conviction—and to the glory of our own times, fanciful

conjectures fly before experiment, like shadows before the sun. Like Pythagoras, who said, 'I am a lover of and an inquirer into truth, rather than one really possessed of it,' the science and its professors claim the same modesty; as knowing, that when we have stretched our faculties to the utmost extent, we know little in comparison of the immensity that lies beyond our reach. Yet nevertheless, though our scanty inquiries are confined to short limits; and though we can but see and reflect upon the phenomena of nature imperfectly; it gives an high—it gives a rational delight to the mind even to be lost in such excursions; for they teach us to be humble; they teach us to be wise; they teach us to be modest concerning our own abilities; and to pay a suitable adoration to that Being who supremely governs the whole."

NOTES.

A. REFERRING TO PAGE 118.

He is invisible, whom no man hath seen, nor can see, at any time; neither hath any man heard His voice at any time, or seen His shape. Heb. xi. 27; 1 Tim. vi. 16; John i. 18; John v. 37.

B. REFERRING TO PAGE 133.

On the fact that the successive Creations and distinct periods to which the phenomena disclosed in geological investigations bear testimony, are announced as if by anticipation in the profoundly ancient Hindoo writings, the accomplished author of "The British Empire in the East," thus remarks—

"The sacred books of the Hindoos, the Vedas, say that Bhrim (the Supreme Being) alone created the world, in the course however of four great periods, the first of which, called Satya-Yug, lasted 1,728,000 years; the second, Trita-Yug, 1,296,000 years; the third, Dvapar-Yug, 864,000 years; and the fourth, Kali-Yug, which is the period now passing, will endure 432,000 years.

"Between each of these great periods of the Creation or developement of the world, there was, say the Vedas, a great and general Deluge, which contributed to give to the earth the form which it had in the following period. But does not this agree in

the most remarkable manner with the most recent discoveries in Geology? and whence could the Hindoos derive this knowledge? To attribute it to a revelation among a heathen nation would be contrary to our religious notions; neither can we ascribe it to tradition, because the origin of the human race (at least according to the principles of Geology) was not in the older, but in the last period. What alternative then, remains, except to suppose that the Hindoos, at that remote era, had, if not a science which preceded that of Werner, Cuvier, Buckland, and Berzelius, at least a philosophical presentiment of what has been confirmed, after the lapse of many thousand years, by the astonishing discoveries of the nations our cotemporaries."

C. REFERRING TO PAGE 145.

" Bhrim, say the Vedas, created, first Time, then the Sun and the Light,[a] afterwards the Sea and the Land, then the five Elements, by the mixture of which Bhrim made the Animals; and last of all, Man.[b]

"[a] Moses, in Genesis, says, that God created the Light, then the Sun and the Firmament.

"[b] According to the principles of Geology the origin of Man was in the last period of the world; in the Biblical style—on the last day of the Creation."

THE BRITISH EMPIRE IN THE EAST, *Lond.* 1840, p. 23.

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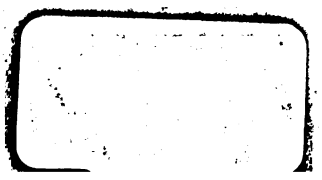
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